SEEDSKADEE PROJECT, WYOMING

COLORADO RIVER STORAGE PROJECT

A Report of reappraisal of direct agricultural benefits and project impacts

OUR SOIL ★ OUR STRENGTH

U. S. DEPARTMENT OF AGRICULTURE
Salt Lake City, Utah

cc: Beattie 7/8/63

USDA-SCS-PORTLAND, OREG. 1957 M-1739

ACKNOWLEDGMENTS

This report is based on available field data, published reports, and the combined judgement of agricultural technicians familiar with the project area, its agricultural problems and conditions. The Bureau of Reclamation has furnished the USDA Field Party with preliminary reports, land classification maps and field sheets, information regarding water supply and acreage and location of lands to be included in the project. This information is used to augment field investigations such as soil surveys, economic surveys, engineering surveys, crop yield determinations, soil moisture studies, and irrigation water investigations made by members of the USDA Field Party, Soil Conservation Service and Agricultural Research Service.

The U. S. Forest Service and U. S. Bureau of Land Management assisted in the watershed studies. The Forest Service also prepared Chapter III regarding the relationship of the project to national forest lands. Assistance from representatives of the University of Wyoming, Wyoming Cooperative Extension Service, Wyoming Agricultural Experiment Station, State and County Agricultural Stabilization and Conservation Committees, U. S. Farmers Home Administration, and others was valuable in preparing the report.

The contributions and assistance of these organizations in the preparation of this report are gratefully acknowledged.

UNITED STATES DEPARTMENT OF AGRICULTURE

REPORT OF

REAPPRAISAL OF DIRECT AGRICULTURAL BENEFITS
AND PROJECT IMPACTS

SEEDSKADEE PROJECT

WYOMING

COLORADO RIVER STORAGE PROJECT

In Cooperation With
Bureau of Reclamation
United States Department of the Interior

Report Prepared by

USDA Field Advisory Committee & USDA Field Party

Salt Lake City, Utah - November 1958

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SUMMARY

REPORT ON REAPPRAISAL OF DIRECT AGRICULTURAL BENEFITS & PROJECT IMPACTS SEEDSKADEE PROJECT - WYOMING

Authority and Scope

This report of the Seedskadee project, Colorado River Storage Project has been prepared by the U. S. Department of Agriculture in response to the President's letters of March 19, 1954 to the Secretary of Agriculture and the Secretary of the Interior. In his letters, the President requested that a reappraisal of the direct agricultural benefits anticipated from the participating projects of the Colorado River Storage Project be made by the Department of Agriculture in cooperation with the Department of the Interior. Following authorization of the Colorado River Storage Project by the Congress on April 11, 1956, an understanding was reached in July 1956 between the Secretary of Agriculture and Secretary of the Interior regarding conduct of a survey to reappraise direct agricultural benefits and to appraise project impacts. The Department of Agriculture survey was made under the authority of Section 6, Public Law 566, 83rd Congress, as amended, which authorizes the Department to cooperate with other federal, state, and local agencies to make investigations and surveys of the watersheds of rivers as a basis for the development of coordinated programs. The survey is based on the Seedskadee project plan as outlined by the Bureau of Reclamation and the reappraisal of direct agricultural benefits is confined to the proposed project facilities and the lands which they will serve.

In addition to the agricultural phases, this report deals with the impacts of the project on the national forests and the relationship of watershed conditions to the project. This report is intended to aid the Bureau of Reclamation in developing a sound project plan and to provide information bearing on the relationship of regular programs of this Department to the project.

General Description

The Seedskadee project is located in the south central portion of the upper Green River Basin in Sweetwater and Lincoln Counties, Wyoming. Elevation of project lands varies from 6,200 to 6,500 feet; the climate is arid with fairly cool summers and cold winters. Average annual precipitation is about eight inches. Based on available information the frost-free period is estimated to average one-hundred days per year.

Project lands are presently used for grazing by sheep. Vegetative cover consists largely of sagebrush, shadscale, small desert shrubs and grasses.

Ownership of project lands is 68 percent public domain, 23 percent railroad, with the remaining nine percent being owned by the State of Wyoming, Rock Springs Grazing Association and private landowners.

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Proposed Project Development

The Seedskadee project will provide irrigation water for 59,620 acres of presently undeveloped lands. This water will be supplied by diversions from the Green River, supplemented by releases from the proposed Fontenelle Dam and Reservoir during late-season months when streamflow is insufficient to meet project demands. Fontenelle Reservoir will store surplus flows of the Green River and will have a total capacity of 285,000 acre feet with an active capacity of 90,000 acre feet. Topography of the site is such that 195,000 acre feet of storage capacity will be below the elevation of the outlets to the project canals.

Evaluation of Expected Direct Agricultural Benefits

Evaluation Areas

For purposes of the analysis, project lands were grouped into four evaluation areas. The soils, climate, water supply and other physical factors in each evaluation area reflect similar crop adaptations, productivity, land development requirements and production costs.

Project lands in each evaluation area are treated as a unit in the several phases of the analysis, and farm incomes and direct agricultural benefits are determined for each area and the project as a whole.

Evaluation area A includes 26,074 acres of project lands generally located on the higher river terraces along the Green River. Evaluation area B includes 8,972 acres of land generally having steeper slopes than evaluation area A, but interspersed with these lands.

Evaluation area C includes 15,984 acres of land generally located on either side of Big Sandy Creek above its confluence with the Green River. Evaluation area D includes 8,590 acres of land located on the first river terrace above the flood plain of the Green River.

Climate and distance to markets will restrict crop production from project lands to feed crops such as alfalfa, small grain and rotation pasture. These crops will be grown in evaluation areas A, B, and C. Soil limitations further restrict use of land in evaluation area D to permanent pasture.

Soils

Bureau of Reclamation land classification field sheets were used to select sites on which detailed soil surveys were made on a sampling basis by the Soil Conservation Service. In addition, detailed investigations were made by Soil Conservation Service, USDA Field Party, and Agricultural Research Service personnel.

Evaluation area A includes 26,074 acres of project lands, 93 percent of which are in capability class II and seven percent in capability class III. Evaluation area B comprises 8,972 acres, 99 percent of which are in capability class III and one percent in capability class IV. Evaluation area C is represented by 15,984 acres, 41 percent of which are in capability class III and 59 percent in capability class IV. Lands in capability classes II, III, and IV are suitable for cultivation and the production of all climatically adapted crops. Evaluation area D is composed of 8,590 acres, all of which are in capability class VI. This land is not suitable for cultivation and should be used only for permanent pasture.

Irrigation Supplies and Requirements

Several comprehensive studies of irrigation requirements have been made in the general vicinity of the Seedskadee project. These data, with additional information supplied by personnel familiar with the area, were used in determining irrigation water requirements.

Irrigation efficiencies will be low due to the low water-holding capacity of project soils which will require frequent light irrigations. The estimated efficiencies range from 42 percent for evaluation area A to 27 percent for evaluation area D.

Based on a weighted average seasonal consumptive use of 1.47 acre-feet per acre and an estimated weighted average farm irrigation efficiency of 36 percent, the average water requirement at farm headgates will be 4.06 acre-feet per acre. This is about 20 percent higher than the farm delivery requirement estimated by the Bureau of Reclamation. However, reservoir operation studies, based on the historical records of the Green River, indicate that available water supplies will be adequate to supply the higher requirements in all but extremely dry years like 1931, 1934, and 1940.

The water supply available for delivery to farms during the study period of 1930-1955, if Fontenelle Reservoir had been in operation, would have averaged 98 percent of the estimated requirements as shown in this report.

Land and Irrigation Development

Development costs for project lands are estimated by evaluation areas on the basis of the level of management expected on the project and the physical requirements of the soils and site conditions. They are consistent with anticipated irrigation efficiencies and expected crop yields.

Project lands are presently in native cover and will require complete subjudgation. Estimated costs include clearing, land leveling and establishment of farm irrigation systems. No estimates for on-farm drainage installations have been made because it is anticipated that project drainage proposed by the Bureau of Reclamation will be adequate.

Average development costs per acre of irrigable land are; evaluation area A $67.67, evaluation area B $45,36, evaluation area C $56.36, and evaluation area D $27.86.

Direct Agricultural Benefits and Potential Farm Incomes

The economic analysis of the proposed Seedskadee project is concerned with two primary objectives: (1) To estimate direct agricultural benefits, and (2) to appraise the prospects for a successful, stable irrigated agriculture. Direct agricultural benefits were estimated from crop budgets based on projected market prices. Four farm types--grade-A dairy, feeder steer calves, farm flock sheep, and general farms--were tested by farm-income budgets to appraise their income prospects.

Project lands are expected to be used largely for the production of feed crops. Based on climatic conditions, anticipated markets for agricultural commodities and experience with other similar areas, it is anticipated that livestock and livestock products will be the predominant sources of farm income from the project. At the present time no additional federal grazing permits are available; consequently, all feed for additional livestock in the area is assumed to come from the production of hay, grain, and pasture crops on project lands.

The residual approach is used to estimate direct agricultural benefits from irrigation water. The total value of crop and pasture production is allocated to the various factors of production in accordance with their projected market prices with the residual being credited to the project as a direct agricultural benefit.

Estimates of incomes and benefits are based on 160-acre farms in area A, 180-acre farms in area B, and 200-acre farms in area C. It is assumed that land in area D will be used in conjunction with farms in the other three evaluation areas. Tracts of 160 acres are used as an analytical base for area D. These estimated net benefits are $11.14, $8.25, $7.06, and $2.14 per acre, respectively. The weighted average for the entire 59,620 acres is $8.31 per acre, or about $495,000 annually for the proposed project. An analysis of the farm-income budgets indicates that this estimate of direct agricultural benefits approaches the maximum likely to be realized in the project area.

For the farm sizes analyzed, relatively uniform farm incomes are indicated for the three evaluation areas. The income variations between farm types are relatively small except that grade-A dairy farms show income prospects about 50 percent greater than other farm types. This income advantage over other types is offset largely by the high operator and family labor requirements. The general conclusion from this analysis is that the potential income prospects for the types of livestock farms budgeted when fully developed would be adequate to provide a reasonably satisfactory level of living and make some payment for the cost of irrigation water.

Relationship of the Seedskadee Project to National Forest Lands

The Seedskadee project will not impair any existing facility or service on national forest lands.

Relationship of Watershed Conditions to the Seedskadee Project

The relationship between the Seedskadee project and the watershed above the project can best be described by dividing the watershed into the following two subwatersheds:

A. Drainage area tributary to Seedskadee project lands consisting of side drainages through the project and containing approximately 2,297 square miles.

B. Drainage area of the Green River above the proposed Fontenelle Dam containing approximately 4,335 square miles.

Project lands and canals are in no serious danger from flooding due to small amount of runoff and the location of irrigated lands. Even though project lands or facilities are in little danger from flooding, the establishment of land treatment measures on watershed lands in subwatershed A, and improvement of vegetative cover will reduce operation and maintenance cost by reduction of sediment deposited in the irrigation system.

The watershed condition above Fontenelle Reservoir varies. Generally erosion on the high elevation lands is slight and erosion on the foothill areas is moderate. Some sediment from both locations is contributing to the stream load. The establishment of land treatment measures on problem areas will reduce sediment carried by the stream and extend the useful life of the reservoir.

Needed watershed treatment can be accomplished under regular programs of federal land administering agencies and by private landowners with assistance such as would be furnished by federal and state agencies through Soil Conservation Districts and otherwise. The users of watershed land will receive sufficient benefits to justify their cooperation in this effort.

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE — M-2179-3

PROJECT LAND MAP

SEEDSKADEE PROJECT

LINCOLN & SWEETWATER COUNTIES, WYOMING

AUGUST 1958

7-S-19394-N

REPORT OF REAPPRAISAL OF DIRECT AGRICULTURAL BENEFITS AND PROJECT IMPACTS SEEDSKADEE PROJECT, WYOMING

CHAPTER I

GENERAL INFORMATION

Organization

Pursuant to the U.S. Department of Agriculture Memorandum of Understanding between the Soil Conservation Service, Forest Service, and Agricultural Research Service dated February 2, 1956, a USDA Field Advisory Committee, Colorado River Storage Project was established. The committee is composed of a representative from each of these agencies and a member representing the concerned state agricultural colleges. Principal duties of the committee are to maintain appropriate liaison and facilitate coordination of activities by the respective services and the state agricultural colleges in the survey. Field relationships with the Bureau of Reclamation and other interested state and federal agencies are also a responsibility of the committee.

A USDA Field Party, working under direction of the USDA Field Advisory Committee and operating within a plan of work dated August 22, 1956, is headquartered at Salt Lake City, Utah. The party is responsible for the collection and analysis of data and the preparation of this report.

Description of the Area

Location and Physical Features

The Seedskadee project is located in the south central portion of the upper Green River Basin. The majority of the project lands are in Sweetwater County, Wyoming with a small acreage located in Lincoln County, Wyoming. Project lands are located on both sides of the Green River and extend approximately 15 miles below and 16 miles above the junction of the Big Sandy Creek and the Green River.

A portion of the lands parallel Big Sandy Creek and are situated on both sides of the creek upstream from its confluence with the Green River and extending to the Gasson Bridge. Project lands are located on a step-like succession of river terraces at elevations of from 6,200 to 6,500 feet above sea level.

The Green River heads in the Wind River and Wyoming Mountain Ranges of Wyoming. It flows in a southerly direction through southwestern Wyoming and eastern Utah, and joins the Colorado River near Sentinel Rocks, approximately 40 miles south and west of Moab, Utah.

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The geology of the upper Green River Basin has been influenced by the mountain ranges surrounding the basin. This is particularly true of the Uinta Mountains which form the southern boundary. Tertiary sediments chiefly derived from the surrounding mountains fill the Green River Basin to a depth of several thousand feet. Major formations are the Green River, Bridger, and Wasatch.

Soils in the project area are generally sandy and are underlain by gravel, sandstone and shale.

Climate

The project has a temperate, arid climate with summers fairly cool and winters cold.

No weather stations had been established in the project area until this past year when the Bureau of Reclamation established four temperature recording stations. Long-time weather records show an average frost-free period of 89 days at Farson, Wyoming and 100 days at Green River, Wyoming. Based on a review of these records, it was concluded that the weather records for the town of Green River were most nearly representative of project conditions, and were used in the analysis. Wind velocity records are not available but the area is known to be subject to high wind velocities. Based on available precipitation records, it is estimated that the average annual precipitation for the project area is approximately eight inches. About half of this moisture falls during the five month period, May to September.

Present Agriculture

Most project lands are presently used for grazing by sheep. Vegetative cover consists largely of sagebrush, shadscale, small desert shrubs and grasses. A few small scattered patches of bottom lands are being irrigated by diversions from the Green River during high water stage. These lands produce mostly low quality grass and sedge hay and are subject to flooding from the river. They are not proposed for inclusion in the project.

Approximately 68 percent of the project lands are public domain, administered by the Bureau of Land Management. These lands have been withdrawn from public entry for reclamation purposes. The Union Pacific Railroad owns 23 percent of the land with the remaining nine percent being owned by the Rock Springs Grazing Association, State of Wyoming, and private landowners.

General

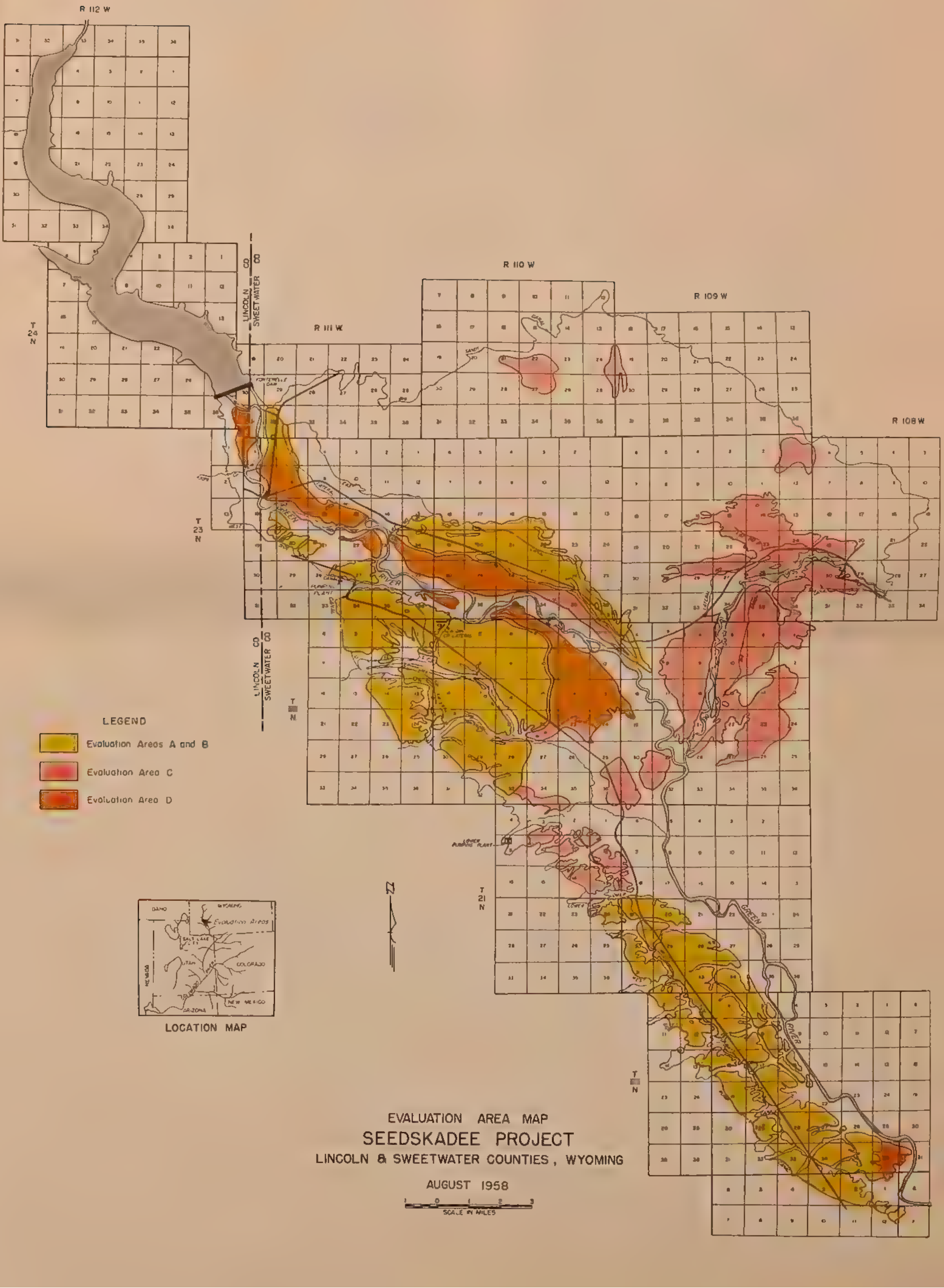
The raising of sheep and the mining of coal have been the major industries in Sweetwater County. Sheep raising has been curtailed somewhat because of the depleted vegetation on federal and private rangelands. Coal production has also declined considerably in recent years due to competition from other fuels.

A Wyoming State secondary road, beginning at Highway 30 west of the city of Green River and running north to US Highway 189, passes midway through the project lands and provides access to lands on the west side of the Green River. Another state secondary road from Farson crosses the Green River below the proposed Fontenelle Dam and provides access to project lands on the east side of the Green River that lie adjacent to Big Sandy Creek. US Highway 30 is located approximately 10 miles south of the southern end of the project and US Highway 189 is approximately 10 miles northwest of the northern end of the project. These two highways and the Union Pacific Railroad, which passes through Green River, Wyoming, provide access to outside markets.

There are no towns in the project area. Green River, Wyoming, 14 miles southeast of the southern project boundary, is the closest town.

Proposed Development

The proposed Fontenelle Reservoir will divert direct flow of the Green River, will store surplus spring flows, and will supplement late-season flow to provide irrigation water for 59,620 acres of presently undeveloped lands. The reservoir will have a total capacity of 285,000 acre feet and an active capacity of 90,000 acre feet of water. Eighty-five thousand acre feet will be used for irrigation and 5,000 acre feet for fish and wildlife. Topography of the site is such that 195,000 acre feet of storage capacity is below the elevation of the outlets to the project canals. The project plan provides for a system of canals, hydraulic turbine-powered pumps, siphons, diversions, and other structures to convey water to the project lands. It also calls for project drainage in areas where underlying materials might cause a high water table to develop.



LEGEND

🟨	Evaluation Areas A and B
🟥	Evaluation Area C
🟧	Evaluation Area D

LOCATION MAP

EVALUATION AREA MAP
SEEDSKADEE PROJECT
LINCOLN & SWEETWATER COUNTIES, WYOMING

AUGUST 1958

CHAPTER II

EVALUATION OF DIRECT AGRICULTURAL BENEFITS TO BE EXPECTED FROM THE SEEDSKADEE PROJECT

In evaluating the direct agricultural benefits expected from the project, plans as outlined by the Bureau of Reclamation served as the basis for the survey. The report is based on the proposed project facilities and the lands which they will serve.

Consideration was given to the following items:

1. Project soils and their suitability for irrigated crop production.
2. Irrigation requirements and water supplies.
3. Land and farm irrigation development.
4. Evaluation areas.
5. Size and type of farming, together with anticipated crops and crop yields.
6. Farm income potentials.
7. Direct agricultural benefits.

Evaluation Areas

To facilitate the presentation of basic agricultural data and to assist in the reappraisal of direct agricultural benefits, project lands were grouped into four evaluation areas. These areas have been designated as evaluation areas A, B, C, and D. The soils, climate, and water supply within each evaluation area reflect similar crop adaptations, productivity, land and irrigation development and production costs. Principal differences recognized in distinguishing between evaluation areas on this project are variations in soils, land development, and method of irrigation. These differences are reflected primarily in depth of soil to gravel, slope and water-holding capacity.

Climate and distance to markets restrict land use to the production of feed crops for local utilization, such as alfalfa, small grain and rotation pasture. These crops will be grown in evaluation areas A, B, and C. Soil limitations further restrict lands in evaluation area D to permanent pasture. It is unlikely that any farm unit on the project will be composed entirely of lands in only one evaluation area.

Acreage of project lands in the evaluation areas are as follows:

Evaluation area	Acres
A	26,074
B	8,972
C	15,984
D	8,590
Project total	59,620

Evaluation Area A - This area of 26,074 acres includes project lands on the older river terraces on both sides of the Green River. The terraces on the west side extend almost the full length of the project but are noncontinuous. The soils are moderately coarse textured, permeable, and well drained. The depth to gravel is generally more than 60 inches and the slopes are not more than two percent. These soils have rapid water-intake rates and medium to low water-holding capacities. They are adapted to the border method of irrigation and are expected to have the lowest labor requirements, the highest irrigation efficiency and produce the highest yield of crops within the project.

Evaluation Area B - The 8,972 acres in this evaluation area are the steeper lands interspersed with the lands of evaluation area A on the high Green River terraces. Evaluation area B includes soils which are dominantly loamy sand and gravelly loamy sand textures on slopes which average about four percent. These coarser textured soils in evaluation area B also have a lower water-holding capacity than the soils in evaluation area A. Because of the slopes, flood irrigation from contour ditches is the most practical method of applying irrigation water. Some limited areas with flatter slopes may be bench leveled for border irrigation. Compared to evaluation area A, less uniform application of water is expected, consequently lower irrigation efficiencies and lower crop yields are anticipated.

Evaluation area C - This 15,984 acre area is located on either side of Big Sandy Creek above its confluence with the Green River. The soils in the northeast portion of this area have been developed from sandstone. The remainder have developed from local alluvium that has been deposited over general alluvium underlain by interbedded sandstone and shale. Soils are moderately coarse textured, 20 to 30 inches deep over gravel on slopes generally of one percent. The shale underlying the gravel appears to have an undulating surface. This uneveness restricts and directs ground water movement. High water tables and wet soils may develop when irrigated. This condition should be alleviated with project drainage as planned by the Bureau of Reclamation. Irrigation water generally will be applied by the border method. These moderately deep soils have a rapid water-intake rate and a low water-holding capacity, and will require more frequent water application than soils in evaluation areas A and B. Irrigation efficiencies will be about the same as for evaluation area B, but yields of alfalfa hay are anticipated to be lower than those for evaluation areas A and B because of shallower soil.

Evaluation Area D - This evaluation area includes 8,590 acres of land located on the first river terraces above the flood plain of the Green River. These terraces are located on both sides of the Green River north of its confluence with Big Sandy Creek. Soils are moderately coarse textured and gravelly on slopes of not more than two percent.

They are alternately very shallow (10 inches) on the ridges and shallow (18 inches) in the swales over clean sand and gravel. They have a very low water-holding capacity, which combined with shallow depth, will require very frequent light irrigations. Also included are some small areas of moderately coarse textured soils which are cobbly and have variable depths on a four percent slope. The shallow soils and undulating topography will restrict land development. This will result in low irrigation efficiencies and severe leaching of plant nutrients when surface irrigation is used. Soil limitations restrict this area to the production of permanent pasture.

The reappraisal of direct agricultural benefits is made for the evaluation areas described above. Soils, land development, irrigation requirements, agricultural incomes and agricultural benefits anticipated with the project, are discussed in the report for each evaluation area.

Soil Inventory

Sources of Data

Information relative to the Seedskadee project and surrounding areas is found in the Guidebook of Field Conferences, Soil Survey of the Upper Green River Basin, on the USGS Geology Map of Wyoming, and in reports prepared by the Wyoming Geological Association and Wyoming Planning Board. The Bureau of Reclamation land classification field sheets were used to select sites on which detailed soil surveys were made on a sampling basis by the Soil Conservation Service. As a part of the soil survey, detailed soil profile descriptions were prepared for the soil mapping units. In addition to the information acquired through the soil survey, numerous reconnaissance and detailed investigations were made by technicians of the University of Wyoming, Soil Conservation Service, USDA Field Party, and Agricultural Research Service.

General Description of Soils and Soil Problems

The surface soil on most of the project is loose, sandy and highly susceptible to wind erosion. The constant wind in this area commonly reaches high velocities during the spring period of land preparation for seeding. During the development and land preparation periods, care should be taken to protect the soil by emergency tillage, leaving vegetative material as a mulch, or by clearing only in narrow strips at right angles to the prevailing winds.

Organic matter and fertility are low in all soils of the project. Proper crop rotation under irrigation will help develop and maintain a higher organic matter content than exists under present conditions. To obtain satisfactory crop yields from these soils, nitrogen and phosphorus fertilizers will be required.

Provision for both surface and subsurface drainage is being made in the Bureau of Reclamation project plans. Subsurface drainage will include interceptor drains extending into the shale on the breaks between terraces. These drains are designed primarily to fit the needs in evaluation areas A, B, and part of C on the higher terraces west of the Green River. The

drains will intercept ground water moving along the top of the shale before it reaches the lands on the lower terraces.

In the Big Sandy part of evaluation area C, the underlying sandstone and saline-alkali shale appear to have an uneven surface and low gradient. This condition will present an excess ground water problem with the advent of irrigation. The problem is recognized and the Bureau of Reclamation plans project drainage on these lands. Subsurface drains planned for the project should remove selenium or sodium salts dissolved from the shale and brought into solution by ground water. These drains should also help prevent a general concentration and translocation of these salts upward in the soil.

As a basis for evaluating project lands, soil mapping units were grouped into evaluation areas and land capability units. The land capability classes 1/ are used in the discussion of evaluation areas and in tables one and two to allow a ready appraisal of project soils and the management required to use them over a long period of time without deterioration.

Evaluation Areas A and B

Soils in evaluation areas A and B flank the Green River and occupy prominent river terraces that rise in step-like succession from the river flood plain to about 300 feet above the stream course. The river has deposited material over Bridger shale as it cut each succeeding step down to its present level. The shale found at varying depths under the river terrace material generally is exposed at the terrace breaks. These soils are generally loose and sandy in the surface horizon and may be structureless or have a weak, subangular, blocky structure in the subsoil. Practically all the soils have some lime and may have zones of high lime concentration. A few small spots have lime concentrated as thin cemented lenses. The soils are generally more than 36 inches deep over clean gravel and sand and only in a few local spots is the underlying shale within five feet of the surface.

Evaluation area A includes soils which are primarily sandy loam and gravelly sandy loam texture, occupying slopes not greater than two percent. Some land in evaluation area A is subject to occasionsl flooding from side drainages. This problem will be one of minor importance since the flooding is infrequent and the land will have vegetative cover the majority of the time. Soils in evaluation area A have been grouped into land capability units IIe4 and IIIw (tables 1 and 2). Soils grouped into capability class II occupy 93 percent of this evaluation area. These soils were grouped into Class II because they have some limitations that require moderate conservation practices for continued production over a long period of time without deterioration. Soils in land capability class III occupy only seven percent of this evaluation area. These soils were grouped into class III because they have severe limitations that reduce the choice of plants or require special conservation practices or both. Soil differences between evaluation areas A and B are confined principally to soil textures and slope.

1/ Land capability classes are in accordance with the national land capability classification "Administrators Memorandum SCS-136, dated May 12, 1958"

Evaluation area B includes soils which are dominantly loamy sand and gravelly loamy sand textures on slopes which average about four percent. These coarser textured soils in evaluation area B also have a lower water-holding capacity than the soils in evaluation area A. Irrigation on the steeper slopes requires greater care to prevent erosion and obtain maximum benefits from applied fertilizer. Soils in evaluation area B have been grouped into land capability units IIIe4 and IVe4. The soils in class III occupy 99 percent of this evaluation area. These soils were grouped into class III because they have severe limitations requiring special management practices for long, continued production. Soils grouped into class IV occupy only one percent of the area. These soils were grouped into class IV because they have very severe limitations requiring very careful management for long, continued production.

Table 1. - General water relationships of land capability units and acreages by evaluation areas, Seedskadee project

Evaluation area	Acres	Land capability units	Percent slope	Soil depth	Water-holding capacity: Inches per foot of soil	Water-holding capacity: Total for soil profile
				Inches		Inches
A	24,338	IIe4	1-2	60	1.33	6.0
	1,736	IIIw	1-3	36	1.33	4.0
Total	26,074					
B	8,912	IIIe4	4	60	1.00	5.0
	60	IVe4	6	36	1.00	3.0
Total	8,972					
C	96	IIIe2	3	26	1.25	2.5
	4,379	IIIe6	1-2	30	1.00	2.5
	1,160	IIIe9	2	24	1.25	2.5
	961	IIIs13	2	28	----	---
	285	IVe4	4	30	1.00	2.5
	7,502	IVs6	1-3	20	0.90	1.7
	96	IVs12	1	30	1.20	3.0
	287	IVe13	4-6	30	1.00	2.5
	1,218	IVs11	1	25	1.20	2.5
Total	15,984					
D	8,590	VIs9	1-4	15	1.00	1.2
Grand total	59,620					

Evaluation Area C

Most of the soils in evaluation area C occupy the terraces flanking Big Sandy Creek and are somewhat different from those along Green River. There exists no pronounced step-like succession, although some terrace levels are slightly higher than others. In age, the soils probably correspond with the younger ones along the Green River. The large amount of sharp, angular sandstone fragments in the soil indicates the soil parent material to be of localized origin and not related to the underlying gravel. Most of the soils have lime which increases with depth to the zone of high lime accumulation generally found between nine and twenty inches. Soils also vary in depth from 20 to 30 inches over clean gravel and sand. This clean gravel and sand averages about five feet thick over sandstone or shale. Smaller acreages in this evaluation area include some soils on the first Green River terrace and some on higher Green River terraces. Those on the first Green River terrace have outwash from Bridger shale deposited on the surface. This material is high in silt and contains salts and sodium of varying degrees. Soil management may require practices to overcome the salt and sodium as well as practices to increase the water-intake rates. Here permanent pasture would be the best land use.

Some of the soils of the higher Green River terraces included in this evaluation area have shale within five feet of the surface. Proposed project drains should help prevent general salt and sodium problems in these soils. Soils are not as deep over clean gravel and sand as soils in evaluation areas A and B. Slopes are generally two percent or less with only about five percent of the acreage on slopes above two percent. These shallow and moderately deep soils will hold less available water than the soils of evaluation areas A and B and will require more frequent applications of irrigation water.

Soils in this evaluation area have been grouped into land capability units IIIe2, IIIe6, IIIe9, IIIs13, IVe4, IVs6, IVs11, IVs12, and IVs13. Class III represents 41 percent of this evaluation area. These soils were grouped into class III because they have severe limitations requiring special management practices for long, continued production. Soils in Class IV represent 59 percent of this evaluation area. These soils were grouped into class IV because they have severe limitations, requiring very careful management for long, continued production.

Evaluation Area D

About 70 percent of this evaluation area occupies the first river terrace above the Green River. The surface of this terrace is a series of ridges and swales. The soils, on the ridges, are very shallow, very gravelly and coarse textured with a zone of high lime concentration which is hard when dry. The soil varies from 10 to 20 inches deep over a clean gravel and sand substratum. This clean gravel and sand substratum is about 13 feet thick over shale. The gravel content in the first seven inches of soil ranges from 18 to 38 percent. In the next seven inches of soil the gravel ranges from 41 to 79 percent. For these same depths the sand ranges from 40 to 47 percent and 19 to 36 percent, respectively.

Table 2.- Soils characteristics by land capability units, Seedskadee project

Land capability unit	Acres	Soil Characteristics											
		Texture	Permeability	Slope percent	Lime content	Susceptibility to erosion	Topography	Depth inches	Underlying material	Wetness	Salinity	Alkalinity	Remarks
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
IIe4	24,338	Sandy loam	Moderate	1-2	High	High	Undulating	60	Cobble, gravel, sand				
IIIe2	96	Gravelly loam	Moderate	3-5	Moderate	Moderate to high	Smooth	20-36	Cobble, gravel, sand				
IIIe4	8,912	Loamy sand & gravelly sandy loam	Moderate to moderately rapid	3-4	Moderate to high	High	Undulating	60	Cobble, gravel, sand, sandstone				
IIIe6	4,379	Gravelly sandy loam	Moderate	1-2	Slight to high	High	Undulating to hummocky	20-36	Sandstone & shale				Slow underdrainage may develop seep & alkali
IIIe9	1,160	Gravelly sandy loam	Moderate	1-2	High	High	Undulating	24	Gravel				
IIIs13	961	Sandy loam	Moderate	2	High	High	Hummocky	20-36	Sandy shale			Strong in shale	Slow-very slow underdrainage
IIIw	1,736	Sandy loam to silt loam	Moderate	1-3	High	Moderate	Smooth	36	Gravel	Subject to flooding			Occupies swales & low places
IVe4	345	Loamy sand & sandy loam	Moderate to moderately rapid	4-6	Moderate to high	High	Undulating to hummocky	30	Gravel or sandstone				

Table 2.- Soils characteristics by land capability units, Seedskadee project, continued

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)
IVs6	7,502	Gravelly sandy loam or gravelly loam	Moderate	1-3	Moderate	Low	Smooth	10-20	Gravel or shale			Seepage & alkalinity under irrigation	Droughty Soil
IVs11	1,218	Loam or silty clay loam	Moderately slow to slow	1-2	Moderate	Low	Smooth to complex	25	Gravel		Moderate	Moderate	
IVs12	96	Gravelly sandy loam	Moderate	1	High	High	Broken convex	20-36	Saline-alkali shale				May have seepage & alkali problem
IVe13	287	Gravelly sandy loam	Moderate	4-6	High	High	Broken dissected convex	20-36	Saline-alkali shale				Outer extremities may become saline
VIs9	8,590	Gravelly sandy loam	Moderate to rapid	1-4	Moderate to high	Low	Undulating to hummocky	10-24	Gravel				Very droughty, ridges very shallow. Leveling may expose gravel
Total	59,620												

Because of the shallow depths and high percentage of sand and gravel, these soils have a very low total available water-holding capacity and will require very frequent, light irrigations. The surface characteristics make land development for efficient surface irrigation very complex and costly. The swales which represent one-third to one-half of the area have a higher yield potential than the ridges. To irrigate the swales, water must be transmitted across the ridges and seepage loss will be excessive. The combination of low water-holding capacity, undulating topography, and the very shallow soils on the ridges and shallow soils in the swales, places this land in land capability unit VIs9, unsuitable for cultivation and suitable only for permanent pasture.

About 30 percent of this evaluation area occupies short, local fans at the base of the next higher terrace. These soils are deep, very cobbly and gravelly on moderate slopes and are also in land capability unit VIs9, unsuitable for cultivation and suitable only for permanent pasture.

Findings

Based on the soil survey information and other investigations, it is concluded that of the 59,620 acres in the project, 51,030 acres are in evaluation areas A, B, and C. Soils in these evaluation areas are grouped into capability classes II, III, or IV and are suitable for the production of all climatically adapted crops. The 8,590 acres in evaluation area D., placed in capability class VI are not suitable for cultivation and should be used for permanent pasture.

Irrigation Requirements and Water Supplies

Sources of Data

There are several studies which include estimates of irrigation requirements in the general vicinity of the Seedskadee project. However, there have been no detailed investigations of irrigation requirements within the project area. Available studies are described in: (1) Appendix B of the Record of the Upper Colorado River Basin Compact Commission; (2) Bulletin 303 of the Wyoming Agricultural Experiment Station, "Estimate of Water Requirements of Crops" by Byron R. Tomlinson; and (3) "Consumptive Use of Water in the Irrigated Areas of the Upper Colorado River Basin" by Harry F. Blaney and Wayne D. Criddle.

Additional related information is contained in the Water Supply Papers of the U.S. Geological Survey, Climatological Data by the U.S. Weather Bureau, and other publications. These related reports were carefully reviewed in this study. In addition, information has been supplied by technicians of the University of Wyoming, Bureau of Reclamation, Agricultural Research Service, Soil Conservation Service, and others familiar with the area.

Analysis of Data

There are few climatological data or other information in or near the project area from which growing season and irrigation requirements can be determined. From a careful review of the location and records of the closest climatological stations, it was concluded that the weather records at the town of Green River would be the most nearly representative of project conditions.

There is considerable variation as to elevation, aspect, exposure, and soils within the project. These variations cause material differences in total water supply requirements through their effect on irrigation frequencies, efficiencies, ditch losses and water tables. The consumptive use requirements for the principal crops climatically adapted to the area were estimated by use of the Blaney-Criddle procedures, using temperature and precipitation records of Green River and the average latitude of the project (table 3). The various irrigation water losses expected within the project were estimated by considering soil characteristics and site locations. Total farm water requirements were estimated by adding these losses to the basic consumptive use estimates (table 4).

Table 3. - Estimate of consumptive use requirements, Seedskadee project

	Alfalfa	Pasture	Small grain
Frost-free period			
Consumptive use coefficient	.85	.75	.75
Consumptive use factor	21.08	21.08	19.59
Consumptive use, acre-inches per acre	17.92	15.81	14.69
Nonfrost-free period			
Consumptive use coefficient	.70	.60	-----
Consumptive use factor	6.03	6.03	-----
Consumptive use, acre-inches per acre	4.22	3.62	-----
Total consumptive use, acre-inches per acre	22.14	19.43	14.69
Effective seasonal precipitation, inches	1.76	1.76	1.14
Net consumptive use requirements, acre-inches per acre	20.38	17.67	13.55

Irrigation Efficiencies

Irrigation efficiencies for the project are expected to be low. Most soils have a low water-holding capacity in the root zone and will require frequent, light irrigations resulting in increased water losses. Adapted crops are few and of a type that will not encourage project farmers to develop lands to the degree that would permit high efficiency of water application.

Water application efficiencies and losses were estimated for each soil mapping unit. This estimate included consideration of the effect of various soil and site factors on irrigation methods and layouts, determination of probable lengths of irrigation runs, frequency of irrigations required, and crop acreage distribution. The effect of projected land development and the expected level of irrigation water management were considered. These data were summarized by weighted factors for each evaluation area.

Evaluation area A includes the deepest soils of the project, with a capacity to hold about six inches of available water in the profile and a normal irrigation replacement of 2½ to 3½ inches. These soils are best adapted to border methods of irrigation, including some areas that might, because of site factors, be leveled as bench borders. They are generally suitable for necessary leveling. Estimated farm irrigation efficiency expected for area A under the projected level of management and development is 42 percent.

Evaluation area B includes soils similar to those in area A, but on steeper slopes. Land leveling will be restricted by these slopes and border irrigation generally may not be practical. The capacity to hold available water is less than for the soils in area A, averaging about five inches. Water replacement generally will be $2\frac{1}{2}$ inches or less. Lighter irrigation applications will be required at more frequent intervals. Basic and average intake rates will be comparable to the rates for soils of area A. Irrigation generally will be by means of flooding between closely spaced contour ditches. Average farm irrigation efficiency for area B is estimated at 36 percent.

Soils in evaluation area C are generally coarser textured and shallower than those in areas A and B. Total available water that the soil profile can hold is less than $2\frac{1}{2}$ inches with a replacement requirement of about $1\frac{1}{4}$ inches. Very light and frequent applications will be required. Some soils with replacement capacity averaging about one inch in the root zone will require irrigation at intervals of less than one week during the period of high water use by plants. This will result in high irrigation labor input. Irrigation of most of the area will of necessity be by border methods. Irrigation efficiencies are expected to be quite low, particularly in a small part of the area which, because of steep slopes, will be flood irrigated from contour ditches. Average farm irrigation efficiency for area C is estimated at 35 percent.

Evaluation area D is composed of soils of shallow depth, flat slopes, irregular to undulating surface, and low water-holding capacity. Total readily available moisture will be less than $1\frac{1}{4}$ inches on 70 percent of the area. The shallow soils in this part of the evaluation area are interspersed with very shallow soils and must be managed in accordance with the requirements of the very shallow soils. Also included in this evaluation area are some cobbly and gravelly soils of variable depth with slopes ranging up to about four percent. There is considerable variance in soils, total available water-holding capacities, and infiltration rates. The soils in this evaluation area are underlain by coarse sand, gravels, and cobbles of high permeability to depths of about 14 feet or more. Leveling will be very limited due to shallow soils and irregular topography over most of the area and will be restricted to the minimum that will permit irrigation by flooding from contour ditches. The average farm irrigation efficiency estimated for area D is 27 percent.

Table 4. - Water losses and irrigation requirements by evaluation areas, Seedskadee project

	Evaluation area				Project total
	A	B	C	D	
	Acre-inches per acre				
Weighted average consumptive use requirements	17.6	17.6	17.6	17.7	17.6
Estimated field application losses	16.8	22.9	23.2	38.6	22.7
Total field application requirements	34.4	40.5	40.8	56.3	40.3
Estimated farm lateral and field ditch losses	7.5	8.3	9.6	9.1	8.4
Total farm headgate delivery requirement	41.9	48.8	50.4	65.4	48.7

Project Water Supply

Irrigation water for the Seedskadee project will be supplied by diversions from the Green River, supplemented by releases from the proposed Fontenelle Dam and Reservoir during late-season months when the stream flow is insufficient to meet project demands. The average annual flows in the Green River are much greater than the annual project requirements. However, there is such fluctuation in the flow during the growing season that project lands would have a seriously deficient water supply without the partial regulation of river flows and seasonal storage provided by the proposed reservoir. The Bureau of Reclamation has made a comprehensive operations study based on historical flows for the 25-year period 1930-1955. A review of this study shows that under project operations, with conditions of weather and runoff similar to those of the study period (which includes the lowest years of runoff on record), the available river flows and reservoir reserves would meet project water supply requirements as shown in table 5 in all but three of the 25 years. The shortages in these three years would occur in the months of July, August, and September. They would be most severe during August, with one year having a water supply only one-quarter of requirements for this month. With all shortages considered, the average water supply available for project irrigation would have been sufficient to meet 98 percent of the average seasonal requirements.

Findings

Based on a weighted average seasonal consumptive use of 1.47 acre-feet per acre, and an estimated average farm irrigation efficiency of 36 percent, the average water requirements at farm headgates will be 4.06 acre-feet per acre. This is about 20 percent higher than the farm delivery requirement estimated by the Bureau of Reclamation. Reservoir operation studies based on historical flows of the Green River indicate that available water supplies will be adequate to supply these higher requirements in all but extremely dry years like 1931, 1934, and 1940 when shortages would occur. Water supply forecasts based on snow surveys in the project drainage area give advance warning of prospective deficient runoff. Use of these forecasts will enable project farmers to minimize the effect of the infrequent shortages through early season adjustment of cropping plans and operations. A high peaking capacity is required for project works because of short irrigation intervals and low water-holding capacities of soils.

The water supply available for delivery to farmers during the study period, with Fontenelle Reservoir in operation, would have averaged 98 percent of the estimated requirements as shown in this report. Project water supply requirements are summarized in table 5.

Table 5. - Projected crop distribution and seasonal consumptive use and water requirement estimates by evaluation areas, Seedskadee project 1/ 2/

Crop	Estimated net seasonal consumptive use requirements	Evaluation area A		Evaluation area B		Evaluation area C		Evaluation area D		Project total	
		Acres	Total net irrig. reqmts.	Acres	Total net irrig. reqmts.	Acres	Total net irrig. reqmts.	Acres	Total net irrig. reqmts.	Acres	Total net irrig. reqmts.
	Acre inches per acre		Acre inches		Acre inches		Acre inches		Acre inches		Acre inches
Alfalfa	20.38	10,430	212,563	3,589	73,144	6,553	133,550	------	-------	20,572	419,257
Pasture	17.67	7,561	133,603	2,602	45,977	4,476	79,091	8,504	150,266	23,143	408,937
Small grain	13.55	7,301	98,929	2,512	34,038	4,475	60,636	------	-------	14,288	193,603
Total		25,292	445,095	8,703	153,159	15,504	273,277	8,504	150,266	58,003	1,021,797
Acre feet			37,091		12,763		22,773		12,522		85,149
Weighted average farm irrigation efficiency, percent			42		36		35		27		36
Weighted average farm delivery requirement, acre feet			88,312		35,453		65,066		46,378		235,209
Acre-feet per acre			3.49		4.07		4.20		5.45		4.06

1/ Productive acres only (59,620 irrigable acres less 1,617 acres nonirrigated R/W, farmstead, etc.).

2/ Percentages rounded.

Land and Irrigation Development

Sources of Data

There is only limited information available which directly relates to development costs of land in the general vicinity of the Seedskadee project. Records of development work accomplished on the Eden project and near Lyman and Pinedale were used where applicable.

Development requirements have been related to the physical characteristics of the various soil mapping units on the project. Amounts of development necessary to be accomplished and especially the requirements or limitations that are imposed by the soil and site characteristics have been estimated by each soil mapping unit and averaged by evaluation areas. Consideration has been given to the levels of management and productivity expected on the project. Cost estimates are based on the U.S. Department of Agriculture price projections of September 1957.

Analysis of Data

The projected level of development under project conditions is based on the expected level of management and the physical requirements of the soils. Irrigation efficiency estimates, labor requirements and other inputs reflect this level of development and management.

Soil and site factors and crop limitations restrict the amount of development that is feasible on the project lands. Shallow, coarse-textured soils limit the development on much of the project, while steep slopes are limiting on other areas.

Land development requirements are summarized in table 6.

Land Clearing

Native cover on Seedskadee project lands consists of sage and associated brushy plants. Because of the severe wind erosion potential, clearing should be deferred until complete subjugation, including planting of crop for cover, can be accomplished. The cost of clearing will vary with the density of cover. It will also be influenced somewhat by the type of land leveling to be accomplished and the methods by which the leveling will be done. Where extensive leveling operations are required, clearing costs will be higher, for the same cover conditions, than in other areas where leveling will be limited to mere smoothing of the surface and removal of minor irregularities. In some areas, particularly in evaluation area D, the sparse sage cover may be killed by flooding and limited use of farm equipment or labor. Most of the clearing on the project will probably be accomplished by the use of farm equipment. Clearing cost estimates range from $3.00 to $7.50 per acre and are based on costs of similar work in other locations. They include allowance for piling and burning of the brush. There are no areas of heavy rock or boulder cover within the project, hence no estimate is included for rock removal.

Land Leveling

Land leveling is defined as "the reshaping of the land surface to a planned grade to permit the uniform distribution of irrigation water without erosion, or to provide necessary surface drainage." This does not imply the removal of all slope or gradient from the land surface, but rather, the elimination of surface irregularities which impair the uniform application of irrigation water, or occasionally, bench terracing of the land to permit irrigation on flatter, transverse slopes. Land leveling adequately accomplished usually constitutes a major expense in the development of irrigated land.

There are wide variations in the amount of leveling required for the different conditions within the Seedskadee project. Considerable areas are unsuited for any but the most limited of leveling operations. In such areas, the work may be accomplished by farm equipment and costs have been estimated accordingly. For these locations, increased irrigation labor inputs, lowered irrigation efficiencies and lower returns associated with this level of development have been used in the project evaluation.

Other project lands are suitable for more intensive leveling, and when so treated can be irrigated more effectively. Estimates of irrigation efficiencies, labor requirements, and returns for these lands reflect the higher standard of development of which they are capable.

Land leveling costs have been related to the requirements for effective irrigation within the limits of projected usage for the different soils. The costs are based on the requirements imposed by soil depth, surface irregularities, and slopes. The degree of development generally reflects the climatic limitations and returns as compared with similar soils and site factors in more favorable locations. Land leveling cost estimates for project lands range from $10.00 to $68.00 per acre. By evaluation areas, the range in estimated cost is from $12.27 to $45.84 per acre (table 7).

Farm Irrigation Systems

Most of the farm ditches will be located in soils with low cohesion, or on comparatively steep slopes. Under these conditions, farm ditches in unprotected natural earth material are unstable and require stabilization by means of ditch structures or structurally stable lining. On the Seedskadee project the crops are essentially small grains, hay, and pastures. It appears that with these close growing crops and a minimum of tillage operations, vegetative cover may be established and maintained in the farm ditches, thus reducing the amount of structural installations necessary. Coarse gravel and cobble contained abundantly in many of the project soils will also form a protective pavement that will help to stabilize farm ditches and laterals in these soils.

Farm ditch requirements have been estimated from the maximum lengths of irrigation runs that are adapted to the different soils. An allowance for the cost of farm laterals has been based on averages of the minimum requirements for typical farm irrigation system layouts. Structure requirements

have been estimated on the basis of requirements for control structures in these layouts. Waste water disposal structures are included. Estimates of the cost of required farm irrigation systems range from $5.65 to about $26.00 per acre. By evaluation areas the range in estimated cost is from $9.63 to $16.76 per acre (table 7).

Table 6. - Summary of land and irrigation development requirements, Seedskadee project

	Evaluation area			
	A	B	C	D
Irrigable acres	26,074	8,972	15,981	8,590
Dominant slope, percent	1 & 2	4	1	1
Dominant profile depth, feet	5	5	2½	1
Dominant irrigation method	Border	Contour ditch & flooding	Border	Controlled flooding
Average farm irrigation efficiency, percent	42	36	35	27
Average length of runs, feet	625	122	570	227
Field ditch & lateral required per acre, feet	99	690	122	325
Average leveling earthwork, cubic yards per acre	278	144	254	83
Estimated average clearing cost, per acre cleared	7.50	5.00	5.00	3.00
Ditch structures, estimated cost per net acre	5.00	5.00	5.65	3.00

Drainage

Comparatively shallow depths to shale exist over large parts of the project. However, for most of the area, this restrictive material is overlain by beds of highly permeable gravel and cobble. Localized high water tables might develop in these areas for brief periods during the latter part of the irrigation season. The permeability of the gravel and cobble is such that rapid and adequate drainage should occur and it is not anticipated that farm drainage will be required in these areas. Seepage water from these deposits will be collected and removed by project drainage facilities.

A part of the project, notably lands in evaluation area C, are subject to the development of persistant high water tables and drainage problems. This probability has been recognized by the Bureau of Reclamation and provision made for project drainage in this area. Soils of the area are permeable and are underlain by highly permeable materials that are readily drainable. The project drainage facilities planned for installation are expected to be effective in removing excess water from the underlying coarse material.

Isolated areas of limited extent in evaluation area A and that part of evaluation area C with sandstone substrata are topographically so situated that wet conditions occasionally exist. These conditions can be expected to become more persistant under irrigation. However, land leveling and supply and waste ditch installation should remove the topographic features that cause this condition.

It is improbable that on-farm drainage will be required on the project. Accordingly, no estimate for farm drainage installation has been made.

Findings

Estimates of development costs for project lands are based on analysis of the physical requirements of the soils and site conditions. They are related to project economic conditions and to the minimum requirements for land and water management at the levels expected to be obtained on the project. Weighted average development cost estimates are summarized by evaluation areas in table 7.

Table 7. - Weighted average development costs per irrigable acre, by evaluation areas, Seedskadee project

Evaluation areas	Clearing	Leveling	Farm irrigation system	Total development cost
	- - - - - - - -	- - - - - - - -	Dollars	- - - - - - - -
A	7.28	45.84	14.55	67.67
B	4.85	23.75	16.76	45.36
C	4.85	41.88	9.63	56.36
D	2.97	12.27	12.62	27.86

Projected Agricultural Economy

This section and the three to follow present an economic appraisal of the proposed Seedskadee irrigation development. This appraisal consists of two inter-related parts: (1) An appraisal of direct agricultural benefits from project development; and (2) an analysis of prospective farm incomes from representative types of farms considered most likely to develop after the project is installed. Both of these analyses contribute to a general appraisal of the prospects for a successful, stable irrigated agriculture economy.

Procedures

The estimate of probable agricultural benefits and the appraisal of prospective farm incomes were both derived by farm budgeting procedures. In the analysis of agricultural benefits, the budgeting was limited to costs and returns of crops and pasture production as would exist with a livestock economy. In order to appraise the income prospects likely to be achieved, however, all of the enterprises included in farm operating units are considered in an analysis of farm types expected in the area. The principal difference is that the second approach carries the analysis of costs and returns through livestock enterprises. In both approaches the same farm acreages, cropping systems, and crop yields are assumed.

The crop-production budgets consist of three basic elements: (1) The estimated quantity and value of crops and pasture anticipated after full development of the land and farms; (2) the quantity and value of economic resources employed in achieving the assumed level of production; and (3) the delay involved in achieving the ultimate level of production which is accounted for by discounting procedures.

Major assumptions underlying the crop-budget method are: (1) That the projected hay price for the State of Wyoming and the pasture prices derived therefrom represent their future market values in the project area; and (2) labor and management rates used are appropriate for crop and pasture enterprises and are equivalent to rates off the project in summer employment.

Farm-income budgets, representing costs and returns of all of the enterprises anticipated for given farm types, are used for estimating the residual incomes available as compensation to farm operators and their families for their labor and management and for payment of water charges after complete farm and project development. The major elements involved in this analysis are: (1) The quantity of agricultural products produced for sale and their expected market values; (2) the quantity and value of resource inputs that must be expended by project farmers to achieve the level of production anticipated (exclusive of water costs); and (3) an allowance for the management and labor of the operator and family equivalent to estimated incomes that would be derived from alternative year-round employment off the project.

The farm income budgets also serve as a check upon the direct agricultural benefits derived from the crop budgets. The two budget procedures will result in similar estimates of direct benefits when all inputs and outputs have been evaluated in a comparable way.

A wide variety of farm sizes and types may be anticipated in the Seedskadee project. In some instances the farms may contain land in two or more evaluation areas. In order to reduce the volume of computations, it was assumed that: (1) The costs and returns of four major types of farms are representative of a wide range of farm types; and (2) that farms contain land in only one evaluation area. A farm income analysis for area D was not made since the lands in this area are assumed to be used in connection with farms in the other evaluation areas.

Sources of Data

Numerous economic studies of irrigation development have been relied upon for standards used in this survey. The chief sources of data include the economic analyses of other project reports [1] and farm surveys in the nearby Eden-Farson area and the Baggs-Dixon area made in 1956 and 1957. This information was supplemented by findings from other agricultural surveys, and by the judgement of many informed individuals.

Commodity Price Projections

All prices used for estimating potential incomes and associated costs are based upon the September 1957 price projections of the U. S. Department of Agriculture. These projections are based on "relatively high employment, a trend toward peace, continued population and economic growth, and a stable general price level."

The price and cost projections are tied to an all-product index of 235 (1910-14=100) for prices received by farmers and an index of 265 for prices and rates paid by farmers, including items used in production, interest, taxes, and wages.

The price of rotation pasture used in the benefit analysis is derived from the long-term projected price of alfalfa. The computed price is based on the net income derived from alfalfa, adjusted for differences in costs of production and per acre yield of total digestible nutrients. The derived price results in the same net return per acre for alfalfa hay and rotation pasture.

The quality of forage likely to be produced on permanent pasture (evaluation area D) is estimated to be lower in feeding value than forage produced on rotation pasture (evaluation areas A, B, and C). The unit price of $5.00 per animal unit month is based on limited information on rental rates of privately owned land.

Projected prices of crops, livestock, livestock products and selected cost items for the Seedskadee project are shown in table 8.

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[1] Reappraisal of Direct Agricultural Benefits for the Vernal unit, Central Utah project, and Paonia, Hammond, and Smith Fork projects.

Table 8.- Long-term projected prices and selected cost items, Seedskadee project

Product	Unit	Price 1/
		Dollars
Prices received		
Alfalfa, baled 2/	Ton	21.20
Straw, baled	Ton	10.00
Barley	Bushel	1.00
Market milk 3/	Pound (b.f.)	.97
Grade-A milk	Pound (b.f.)	1.20
Grade-C milk	Pound (b.f.)	.74
Cull dairy cows (1,200 lbs.)	Pound	.10
Springer heifers	Each	150.00
Range steer calves (350 lbs.)	Pound	.21
Grass-fat steers (784 lbs.)	Pound	.19
Cull farm ewes	Each	10.80
Grass-fat lambs	Pound	.20
Wool	Pound	.49
Cost items		
Hired labor	Hour	1.00
Custom rates		
Raking hay	Acre	1.00
Combining grain	Acre	6.00

1/ Net prices received by farmers.
2/ Price in stack after shrinkage.
3/ Weighted average includes 50 percent grade-A and 50 percent grade-C at 3.5 test.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Farm Sizes

Income potentials and farm sizes on the Seedskadee project have been given detailed attention in a previous report. [1] This analysis indicated that at least 160 acres, 180 acres, and 200 acres for evaluation areas A, B, and C, respectively, will be necessary to achieve a satisfactory agricultural economy on the Seedskadee project. Later, taking into account this special study and studies by other agencies, legislation was passed for the Seedskadee project which, in effect, increases the limitation of ownership above 160 acres. [2]

In view of the above considerations, incomes and benefits are estimated in this report on the basis of 160, 180, and 200 acres for evaluation areas A, B, and C, respectively. The estimate of agricultural benefits for evaluation area D is made on the basis of 160-acre tracts. However, it is assumed that these lands will be used in conjunction with farms in other evaluation areas.

It is recognized that sizes of operating units may be substantially larger during the life of the project. Renting in particular is a frequently used means to enlarge operating units.

Anticipated Crop Yields

Feed crops only are expected to be grown on the Seedskadee project because of the short growing season and distance to markets. Crop yield estimates for evaluation areas A, B, C, and D are shown in table 9. Production estimates with irrigation development for each of these evaluation areas are based on yields obtained on comparable irrigated areas and other pertinent crop yield data. All yields reflect an estimated average level of managerial skill for farmers on the project.

Table 9.- Estimated crop yields with full development of project lands by evaluation areas, Seedskadee project

Crop	Unit	Evaluation area			
		A	B	C	D
Alfalfa 1/	Ton	3.0	2.7	2.5	---
Rotation pasture 1/	AUM	5.3	4.8	4.8	---
Barley	Bushel	45.0	40.0	40.0	---
Permanent pasture	AUM	----	----	----	2.0

1/ Fertilizer: Annual rate; alfalfa, 20 pounds available P_2O_5 or equivalent manure per acre; rotation pasture, 20 pounds available P_2O_5 and 15 pounds N or equivalent manure per acre. Total P_2O_5 required applied at time of seeding. Nitrogen applied biennially.

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[1] U. S. Department of Agriculture. A preliminary report on the farm income potentials, Seedskadee project, Wyoming-Colorado River Storage project. Salt Lake City, Utah. April 1958. (Processed).

[2] Public Law 85-797, 85th Congress. Approved August 28, 1958.

Cropping Systems

Present land use in the nearby Eden-Farson area consists of about 69 percent of the cropland in alfalfa and rotation pasture, 28 percent in small grains, and three percent in farmstead and other noncrop uses. Projected land use for the Seedskadee project is expected to approximate present land use in the Eden-Farson area (table 10). A seven-year crop rotation, including five years of forage and two years of small grains, is assumed on lands in evaluation areas A, B, and C. Small grain is grown alone the first year for weed control purposes and is used as a nurse crop with alfalfa or rotation pasture the second year. Evaluation area D is suited only for permanent pasture.

No intensive cash crops are expected to be grown on the Seedskadee project. A few acres of potatoes have been grown in the Eden-Farson area, but frequent frosts make the crop highly uncertain. Production of alfalfa seed and clover seed has been confined to a small acreage for the same reason. Attempts have been made several times to grow corn on bottom lands along the Green River adjacent to Seedskadee project lands. The corn did not reach maturity because of late-spring and early-fall frosts.

Table 10.- Projected crop distribution by evaluation areas, Seedskadee project

Crop	Evaluation area								Total project	
	A		B		C		D			
	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent	Acres	Percent
Alfalfa	10,430	40	3,589	40	6,553	41	-----	--	20,572	34
Rotation pasture	7,561	29	2,602	29	4,476	28	-----	--	14,639	25
Barley	7,301	28	2,512	28	4,475	28	-----	--	14,288	24
Permanent pasture	------	--	-----	--	------	--	8,504	99	8,504	14
Farmstead, etc.	782	3	269	3	480	3	86	1	1,617	3
Total	26,074	100	8,972	100	15,984	100	8,590	100	59,620	100

Direct Agricultural Benefits

Direct agricultural benefits are represented by the value of crop and pasture production expected with project development in excess of production anticipated without the project, less the value of additional farm inputs or associated costs required. The concepts and assumptions on the specific composition and value of nonproject resources or associated costs, as used in this report, are outlined below.

A basic assumption is that the national economy will operate at essentially full employment for the period of analysis. Based on this general assumption alternative employment opportunities would be expected in the national economy for resources used in the development and operation of irrigated farms, including the labor and management skills of farm operators. Also, the projected levels of farm prices received and paid are higher than they would be with a significant amount of unemployment.

Estimates of direct agricultural benefits are based upon crop budgets that account for the quantity and value of crop and pasture production expected after full development of project farms, and the economic cost that will be incurred on the project lands in achieving the level of production expected. Separate estimates have been made for the four evaluation areas and a total computation for the project area as a whole.

The cropping patterns assumed in the benefit analysis are the same as used in the analysis of water requirements and in the analysis of potential farm incomes.

Labor and Management Charges

Labor for crop production on the Seedskadee project will be required and performed during several summer months. Thus, the summer hired wage rate assumed in the analysis has been applied to operator and family labor in the evaluation of direct agricultural benefits from irrigation water. This rate is $1.00 per hour. A management allowance or charge has also been made for the farm operators. This amounts to 15 percent of the hired wage rate.

The composite management and family labor allowance is $1.11 per hour. This allowance is based on the above rates and an allocation of 75 percent of the hours to the operator and 25 percent of the hours to the family.

Return to Land and Water

Alfalfa and rotation pasture constitute nearly 70 percent of the total irrigable acreage (table 10). This same relationship holds for all evaluation areas except area D which is entirely permanent pasture.

The value of crop and pasture production is about $8,500 per farm (table 11). Deduction of all expenses and allowances except for land and water leaves a net return to these resources ranging from more than $17.00 per acre for area A to about $4.25 per acre for area D. The weighted average project return to land and water is about $13.00 per acre.

Table 11.- Weighted average value of crop and pasture production, annual production costs, and return to land and water, by evaluation areas, Seedskadee project

Item	Unit	Evaluation area			
		A	B	C	D
Total land	Acres	160	180	200	160
Alfalfa	Acres	64	73	85	-----
Rotation pasture	Acres	46	51	53	-----
Small grains	Acres	45	51	56	-----
Farmstead, etc.	Acres	5	5	6	1.5
Permanent pasture	Acres	-----	-----	-----	158.5
Operator and family labor	Hours	1,718	2,025	2,244	609
Investment 1/	Dollars	10,424	10,519	10,724	576
Value of production	Dollars	8,537	8,717	9,299	1,585
Production expenses 2/	Dollars	3,327	3,655	3,919	199
Net crop income 3/	Dollars	5,210	5,062	5,380	1,386
Interest 4/	Dollars	521	526	536	29
Net income 5/	Dollars	4,689	4,536	4,844	1,357
Operator and family labor cost 6/	Dollars	1,907	2,248	2,491	676
Net return to land and water					
Total	Dollars	2,782	2,288	2,353	681
Per acre	Dollars	17.39	12.71	11.76	4.26

1/ Excludes investment in land and irrigation water.
2/ Excluding interest, land and water development, and O & M.
3/ Return to operator and family labor and management, capital, and irrigation water.
4/ At five percent, excluding investment in land and irrigation water.
5/ Return to operator and family labor and management, land, and irrigation water.
6/ At $1.15 per hour for operator labor and management and $1.00 per hour for family labor. Weighted average is based on 75 percent of hours by operator and 25 percent of hours by family.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Land Development Costs

The acreage for each evaluation area, estimated price of rangeland, investment in land development and farm irrigation systems, and annual cost per acre are shown in table 12. Costs of farm buildings, machinery, fences and domestic water associated with crop production, establishment of permanent pasture in area D, and maintenance and repairs for the irrigation systems are included as production expenses in table 11. Man and machine labor and costs have been aligned with the degree of development of land and farm irrigation systems for each evaluation area.

Table 12.- Estimated average annual cost per acre of irrigable land for land development and farm irrigation systems, by evaluation areas, Seedskadee project

Item	Unit	Evaluation area			
		A	B	C	D
Land area	Acres	26,074	8,972	15,984	8,590
Capital investment					
Irrigable land 1/	Dollars	3.00	3.00	3.00	3.00
Land clearing	Dollars	7.28	4.85	4.85	2.97
Land leveling	Dollars	45.84	23.75	41.88	12.27
Total land investment	Dollars	56.12	31.60	49.73	18.24
Annual cost 2/	Dollars	2.83	1.59	2.51	.92
Farm irrigation system	Dollars	14.55	16.76	9.63	12.62
Annual cost 3/	Dollars	.80	.92	.53	.69
Total annual cost	Dollars	3.63	2.51	3.04	1.61

1/ Estimated price of rangeland.
2/ Amortized over a 100-year period at five percent interest (factor .05038).
3/ Amortized over a 50-year period at five percent interest (factor .05478). Cost of maintenance and repairs included in farm budgets.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Projected investments in land development and farm irrigation systems per irrigable acre for evaluation areas A, B, C, and D are $70.67, $48.36, $59.36, and $30.86, respectively (table 12). Annual amortized costs per acre at five percent are $3.63, $2.51, $3.04, and $1.61. The weighted annual land and development cost for the project is $3.01 per acre.

The Development Period

Historically, a number of years have been necessary to achieve full development of farms on new irrigation projects. Thus, a lag occurs before agricultural incomes and project benefits are at a level associated with an established agricultural economy. On some projects, only two or three years have been necessary; on others, a much longer period has been required. This lag is recognized by federal reclamation legislation by permitting a development period up to 10 years before repayment charges are levied on the farms.

The assumption is made for the Seedskadee project that a period of 10 years will elapse, after water is available, before the average level of estimated benefits will be achieved. This period is used for discounting purposes.

Findings

Net return to land and water, annual amortized cost of investment in land development and the farm irrigation system, and gross and net direct benefits are summarized on a per-acre and total basis by evaluation areas in table 13. Weighted averages for the project are also shown for each of these items. The discount factor shown in the table is based on a 10-year development period, an interest rate of five percent, and an evaluation period of one-hundred years.

Direct agricultural benefits are estimated on the basis of 160-acre farms in evaluation area A, 180-acre farms in evaluation area B, 200-acre farms in evaluation area C, and 160-acre tracts in evaluation area D. These estimated benefits are $11.14, $8.25, $7.06, and $2.14 per acre, respectively. The weighted average for the entire 59,620 acres is $8.31 per acre, or about $495,000 annually for the proposed project.

Table 13.- Summary of estimated annual direct agricultural benefits and associated development costs based on 160 acres evaluation area A, 180 acres evaluation area B, 200 acres evaluation area C, and 160 acres evaluation area D, Seedskadee project

Evaluation area	Land area	Net return to land and water		Annual amortized cost of land development and investment		Gross direct benefits		Discount factor 1/	Net direct benefits	
	Acres	Per acre	Total	Per acre	Total	Per acre	Total		Per acre	Total
A	26,074	$17.39	$453,426	$3.63	$94,648	$13.76	$358,778	2/.80927	$11.14	$290,348
B	8,972	12.71	114,034	2.51	22,520	10.20	91,514	2/.80927	8.25	74,059
C	15,984	11.76	187,972	3.04	48,591	8.72	139,381	2/.80927	7.06	112,797
D	8,590	4.26	36,593	1.61	13,830	2.65	22,763	2/.80927	2.14	18,422
Project	59,620	$13.28	$792,025	$3.01	$179,589	$10.27	$612,436		$8.31	$495,626

1/ At five percent. Present annual equivalent value per $1.00 of benefits accruing during a 100-year evaluation period.

2/ Assumes a 10-year development period.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Prospective Farm Incomes

The prospects for a successful, stable irrigated agriculture are examined in this section. Estimates are made of farm incomes from several types and sizes of farms with the proposed water development.

Farm incomes are estimated for dairy, feeder steers, farm flock of sheep, and general farms. Budgets for each type of farm were developed for evaluation areas A, B, and C. Farm types, crop rotations, and cropping patterns are assumed to be about the same in the three evaluation areas. Lands in evaluation area D are suitable for permanent pasture only and are not conducive to the establishment of full-time farms.

Farm budgets require many kinds of input-output and price information. Labor requirements, machinery and building needs, land investment, feed requirements, and other data are needed. Published research in similar irrigated areas has been heavily relied upon. These data have been supplemented by information collected in nearby areas.

Livestock Enterprises and Production Rates

Sale of livestock and livestock products are expected to be the predominant sources of income on the project. The acreages would supply sufficient feed for 38 to 40 cows producing grade-A milk and their replacements or 102 to 112 feeder steer calves. On the sheep farms, 268 to 294 farm-raised ewes and replacements would be furnished feed from the farm. Other farms would supply feed for a limited number of livestock and the remaining feed would be sold to range sheepmen and cattlemen.

A rate of 325 pounds of butterfat per dairy cow is assumed. Feeder steer calves are assumed to gain 434 pounds in a year. Farm flock ewes are assumed to produce 108 percent lamb crop and 10 pounds of wool per ewe.

Types of Farms

Types of farms anticipated with project development are based upon projected markets for each agricultural commodity, physical resources of the area, and irrigated agriculture in similar areas of the state. Livestock farms are expected to be the predominant types.

Inasmuch as range resources are presently fully utilized, prospective farmers must depend entirely on irrigated land for production of feed. Thus, numbers of livestock on the project will be limited by the amount of feed produced on irrigated land. No range-type operations are projected.

An assumption is made that types of farming will be about the same in evaluation areas A, B, and C. Evaluation area D is suited to the production of permanent pasture only, to be used in conjunction with the more productive land.

A brief description of each projected farm type follows:

Grade-A Dairy - Dairy herds range in size from 38 to 40 cows. Labor requirements are high. Fifty percent of the milk produced is sold at a grade-A market milk price and 50 percent at a grade-C milk price.

Feeder Steer Calves - When cattle come off the range in the fall, steer calves would be purchased, fed on hay and a small amount of grain during the winter, and grazed on irrigated pasture the following summer.

Farm Flock Sheep - Farm-raised ewes and replacements are kept on the farm the entire year. Young ewes replace the oldest, or poorest ewes which are sold off pasture and lambs are sold as grass-fats.

General - The general-type farm enterprise probably will encompass a large portion of the total farms on the project. The general type represents those farms with small numbers of several kinds of livestock. Some feed is produced for sale. For purposes of this analysis, 10 dairy cows are included in the budget. The milk is assumed to be sold at a grade-C price.

Return to Operator and Family Labor and Management

The prospects for a stable and successful agricultural economy depend upon the level of income likely to be achieved for various types of farms by evaluation areas. Prospective gross farm incomes must be sufficient to cover all ordinary farm operating costs, including interest on investment and costs of land development, to compensate the farm operator and his family for their labor and management, and to pay water costs. The income prospects must be sufficient after full development to compensate the operator for lower income levels during the farm development period. If the above conditions are not in prospect, one or a combination of the following undesirable consequences are likely to result: (1) The project may not attract farmers with the resources required for the type and level of development assumed; (2) the period of settlement and farm development may be unduly long; (3) the operators and their families may be forced to live at substandard levels; or (4) water users may not be able to meet their water payment obligations.

The allowance for operator and family labor and management is based upon the expected earnings of the operators and their families in alternative employment. An average return of $3,100 for essentially full-time-family type farms has been considered to be an acceptable minimum level. This amount is used as a general guide in appraising the adequacy of potential incomes. For farms with greater or less than average operator and family labor inputs, capital requirements, or managerial skills, this return would vary accordingly. The farm dwelling, domestic water supply, and farm produced food are not included as farm expenses in the farm budget analysis.

The $3,100 does not necessarily represent the total income received by the farm family from operations of the farm business. In addition to return for labor and management, the farm family will recieve a return on equity owned in the farm. Returns on investment owned by the operator, in addition to returns for labor and management, would be available for family living expenses, including income and social security taxes, savings, and retirement of debt.

Capital Requirements

Irrigated farming and development of new farms require considerable capital, labor, and management. Total new capital needs on many farms expected on the Seedskadee project will exceed $55,000 per farm (table 14). For example, grade-A dairy farms require from $55,000 in evaluation area B to about $59,000 in evaluation area C. The minimum for the illustrative farms is $40,000 for the general type in evaluation area B. These figures include a residence.

The same sets and values of equipment, farm buildings, and improvements except fences are assumed for evaluation areas A, B, and C within a given type of farm. An adjustment for size differences was made by including more custom machine hire on larger farms.

Table 14.- Capital investment for several illustrative farms by evaluation areas, Seedskadee project

Item	Grade-A dairy	General	Grade-A dairy	General	Grade-A dairy	General
Evaluation area	A		B		C	
Acres	160	160	180	180	200	200
Land	$11,307	$11,307	$8,705	$8,705	$11,872	$11,872
Farm buildings and improvements 1/	9,900	7,200	10,050	7,350	10,200	7,500
Equipment 1/	14,593	11,390	14,593	11,390	14,593	11,390
Livestock	11,300	2,900	11,300	2,900	12,000	2,900
Total farm	$47,100	$32,797	$44,648	$30,345	$48,665	$33,662
Residence 2/	$10,000	$10,000	$10,000	$10,000	$10,000	$10,000
Total needs	$57,100	$42,797	$54,648	$40,345	$58,665	$43,662

1/ Costs of new structures and equipment.
2/ Value assumed to approximate total capital requirements.

Based upon price projections by the U. S. Department of Agriculture, September 1957

Difficulties in farm development are primarily the result of capital limitations. Farmers have demonstrated in recent years on several projects that good production rates can be achieved within two or three years provided the resources, especially capital, are available to develop the land and to obtain the necessary equipment, livestock, and buildings. It is evident that development of the Seedskadee project will require large quantities of farm capital. These needs may pose serious problems.

Findings

Net incomes for the various sizes and types of farms from tables 15, 15A, and 15B are summarized below:

Evaluation area	Acres	Dairy	Beef	Sheep	General
A	160	$6,843	$4,460	$3,967	$4,343
B	180	6,523	4,499	3,974	4,240
C	200	6,403	4,830	4,233	4,270

These incomes are available for payment to the operator and his family for their management and labor and for irrigation water. Many farms will have larger or smaller net incomes than those shown above.

Net incomes on grade-A dairy farms are about 50 percent larger than incomes for other illustrative farm types in all evaluation areas. The dairy type, however, has high labor and exacting managerial requirements. Also, despite attractive estimated incomes, factors such as market considerations, high capital requirements, and personal preferences would likely limit substantially this type of farming in the area.

Income prospects for successful feeder steer calf operations appear to be good. This enterprise is somewhat speculative, however, and requires high levels of managerial ability. Labor requirements for this type of operation are relatively low.

Farm flocks of sheep and general farms are considerably less attractive from the standpoint of incomes than are dairy and feeder calf operations. However, for reasons noted above, a large portion of the farms on the project probably would be similar to these two farm types.

The general conclusion from this analysis is that the potential income prospects for these types of livestock farms when fully developed would be adequate to provide a reasonably satisfactory level of living and make some payments for costs of irrigation water.

Table 15.- Projected agricultural incomes and selected sizes and organizational items for farm budgets by types of farms, evaluation area A, Seedskadee project

Item	Unit	Grade-A dairy	Feeder steer calves	Farm flock sheep	General
Total land	Acres	160	160	160	160
Alfalfa	Acres	78	46	50	100
Rotation pasture	Acres	32	64	60	10
Small grains	Acres	45	45	45	45
Farmstead, etc.	Acres	5	5	5	5
Productive livestock	Number	38	102	268	10
Operator and family labor	Hours	4,500	2,091	2,434	2,718
Investment	Dollars	38,820	30,236	28,016	27,066
Land 1/	Dollars	11,307	11,307	11,307	11,307
Buildings & improvements	Dollars	5,940	4,020	4,260	4,320
Machinery	Dollars	8,756	6,454	6,604	6,834
Livestock	Dollars	11,300	7,570	4,932	2,900
Other	Dollars	1,517	885	913	1,705
Farm receipts	Dollars	14,276	9,307	8,890	9,748
Crop sales	Dollars	1,160	1,732	1,903	7,000
Livestock and products	Dollars	12,919	7,475	6,887	2,574
Other	Dollars	197	100	100	174
Farm expenses 2/	Dollars	5,492	3,355	3,522	4,052
Net farm income 3/	Dollars	8,784	5,972	5,368	5,696
Interest on investment 4/	Dollars	1,941	1,512	1,401	1,353
Net income 5/	Dollars	6,843	4,460	3,967	4,343

1/ Land development costs and purchase price of rangeland. Investment in irrigation water is not included.
2/ Does not include interest on capital and water costs, including O & M.
3/ Return to operator and family labor and management, capital and irrigation water.
4/ At five percent, excluding investment in irrigation water.
5/ Return to operator and family labor and management and irrigation water.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Table 15A.- Projected agricultural incomes and selected sizes and organizational items for farm budgets by types of farms, evaluation area B, Seedskadee project

Item	Unit	Grade-A dairy	Feeder steer calves	Farm flock sheep	General
Total land	Acres	180	180	180	180
Alfalfa	Acres	89	51	57	113
Rotation pasture	Acres	35	73	67	11
Small grain	Acres	51	51	51	51
Farmstead, etc.	Acres	5	5	5	5
Productive livestock	Number	38	104	273	10
Operator and family labor	Hours	4,500	2,413	2,756	2,948
Investment	Dollars	36,335	27,886	25,623	24,597
Land 1/	Dollars	8,705	8,705	8,705	8,705
Buildings & improvements	Dollars	6,030	4,110	4,380	4,410
Machinery	Dollars	8,756	6,454	6,604	6,834
Livestock	Dollars	11,300	7,718	5,007	2,900
Other	Dollars	1,544	899	927	1,748
Farm receipts	Dollars	14,445	9,485	9,043	9,920
Crop sales	Dollars	1,329	1,760	1,935	7,172
Livestock and products	Dollars	12,919	7,625	7,008	2,574
Other	Dollars	197	100	100	174
Farm expenses 2/	Dollars	6,105	3,592	3,788	4,450
Net farm income 3/	Dollars	8,340	5,893	5,255	5,470
Interest on investment 4/	Dollars	1,817	1,394	1,281	1,230
Net income 5/	Dollars	6,523	4,499	3,974	4,240

1/ Land development costs and purchase price of rangeland. Investment in irrigation water is not included.

2/ Does not include interest on capital and water costs, including O & M.

3/ Return to operator and family labor and management, capital and irrigation water.

4/ At five percent, excluding investment in irrigation water.

5/ Return to operator and family labor and management and irrigation water.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Table 15B.- Projected agricultural incomes and selected sizes and organizational items for farm budgets by types of farms, evaluation area C, Seedskadee project

Item	Unit	Grade-A dairy	Feeder steer calves	Farm flock sheep	General
Total land	Acres	200	200	200	200
Alfalfa	Acres	102	62	68	127
Rotation pasture	Acres	36	76	70	11
Small grains	Acres	56	56	56	56
Farmstead, etc.	Acres	6	6	6	6
Productive livestock	Number	40	112	294	10
Operator and family labor	Hours	4,500	2,661	3,029	3,204
Investment	Dollars	40,397	31,829	29,421	27,907
Land 1/	Dollars	11,872	11,872	11,872	11,872
Buildings & improvements	Dollars	6,120	4,200	4,500	4,500
Machinery	Dollars	8,756	6,454	6,604	6,834
Livestock	Dollars	12,000	8,306	5,424	2,900
Other	Dollars	1,649	997	1,021	1,801
Farm receipts	Dollars	15,247	10,240	9,748	10,358
Crop sales	Dollars	1,400	1,911	2,100	7,610
Livestock and products	Dollars	13,650	8,229	7,548	2,574
Other	Dollars	197	100	100	174
Farm expenses 2/	Dollars	6,824	3,819	4,044	4,693
Net farm income 3/	Dollars	8,423	6,421	5,704	5,665
Interest on investment 4/	Dollars	2,020	1,591	1,471	1,395
Net income 5/	Dollars	6,403	4,830	4,233	4,270

1/ Land development costs and purchase price of rangeland. Investment in irrigation water is not included.
2/ Does not include interest on capital and water costs, including O & M.
3/ Return to operator and family labor and management, capital and irrigation water.
4/ At five percent, excluding investment in irrigation water.
5/ Return to operator and family labor and management and irrigation water.

Based upon price projections by the U. S. Department of Agriculture, September 1957.

Relationship of Direct Agricultural Benefits and Prospective Farm Incomes

As indicated in an earlier section, the farm-income budgets serve as a measure of the reliability of the direct agricultural benefit estimates based on the crop-budget analysis. As also stated earlier, the crop and farm-income budgets will result in similar estimates of direct benefits when the inputs and outputs of each are evaluated in a comparable way.

A comparison follows of the benefit estimates derived from the two budget analyses. The same prices are used for those resource inputs applicable to both budgets. A charge for management and operator and family labor of $1.11 per hour is used for both budgets. In the crop budget the value of crops is based on projected market prices. In the farm-income budgets the value of most of the crops produced is included in the returns from the sale of livestock and livestock products. In the farm-income budget analysis, average per-acre benefits are computed by evaluation areas on the basis of an assumed distribution of farm types as follows; Grade-A dairy farm, 10 percent; feeder steer calves, 30 percent; farm flock sheep, 30 percent; and general farm, 30 percent. The results of this comparison expressed as net direct agricultural benefits per acre of irrigated land derived from the two budget approaches for areas A, B, and C are as follows:

	Crop-budget analysis	Farm income budget analysis
Area A - - - - - - - - - - - - - - - - -	$11.14	$8.11
Area B - - - - - - - - - - - - - - - - -	8.25	5.68
Area C - - - - - - - - - - - - - - - - -	7.06	4.77

Since the labor allowance of $1.11 per hour is considered reasonable in comparison with alternative employment opportunities and is consistent with the returns necessary to provide a satisfactory level of living, it follows that the estimates of direct agricultural benefits based on crop budgets approach the maximum likely to be realized. The higher estimates of direct agricultural benefits stem largely from the relatively high values attached to hay and forage production based on projected market prices in comparison with their likely value when used in livestock enterprises in the project area.

CHAPTER III

RELATIONSHIP OF THE SEEDSKADEE PROJECT TO THE MANAGEMENT, PRODUCTION, AND USE OF THE BRIDGER NATIONAL FOREST AND OTHER FOREST RESOURCES

The proposed project features, including Fontenelle Dam and Reservoir, and the canals and distribution systems are entirely outside the exterior boundary of the Bridger National Forest.

Some 25 miles separate the proposed project installations from the nearest Bridger National Forest land. There are no forested lands of other ownership within the flowage area of the reservoir or other parts of the project area.

Findings

The proposed project will not directly impair or affect existing resources, improvements, facilities, or services on the Bridger National Forest. It is expected, however, that through increased population the project will place additional demands upon the forest for timber products and the use of recreational, fishing, other wildlife, and grazing resources. This latter demand is expected to be especially stimulated, because livestock production will be an important part of the completed and functioning irrigation project.

CHAPTER IV

THE RELATIONSHIP OF WATERSHED CONDITIONS TO THE SEEDSKADEE PROJECT

Watershed conditions covered in this report are common to most irrigation projects. They do not materially affect feasibility of the project. However, improvement of watershed conditions will extend the life of the project and reduce operating difficulties and maintenance expenses. They are pointed out here so that local, state, and federal agencies, which deal with watershed lands, can orient their regular and special programs to the eventual solution of these problems.

Location and Size

The watershed area extends from the project lands to the top of the divide that forms the Green River Basin. The western and northern divides are formed by the Wyoming and Hogback Mountain Range, together with the Gros Ventre Mountains. The eastern divide is the Continental Divide made up by the Wind River Mountains.

In this report, watershed conditions and effect are described by dividing the area into the following two subwatersheds:

A. Drainage area tributary to the Seedskadee project lands containing approximately 2,297 square miles.

B. Green River drainage above the proposed Fontenelle Dam containing approximately 4,335 square miles.

A. Drainage Area Tributary to Seedskadee Project Lands

Subwatershed Characteristics

Topography and Geology

This subwatershed is a large, gently sloping basin which is drained by three perennial streams. These are the Green River, Big Sandy Creek and Little Sandy Creek. Sharp relief is limited to the mountain flank and a few bluffs along Green River. There are many playa-like basins in the uplands.

Green River formations of the Tertiary age underlie most of this subwatershed. Undifferentiated formations of the Tertiary age flank the Wind River Range whose granitic complex core is much older. Shales and sandstones make up the Green River members that generally dip south toward the town of Green River.

Wind erosion is significant below the foothills, removing a large proportion of the finer material from the surface soil as the rock deteriorates. The soil mantle of the subwatershed contains a higher percentage of sand than the parent material indicates.

WATERSHED MAP

SEEDSKADEE PROJECT

FREMONT, LINCOLN, SUBLETTE, SWEETWATER & TETON COUNTIES, WYOMING

JUNE 1958

5 0 5 10 15 20 25
SCALE IN MILES

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE USDA-SCS-PORTLAND, OREG. 1958 M-2203

7-0-19437-L

Precipitation and Runoff

No complete records are available, but it is estimated that this subwatershed receives eight to ten inches of precipitation annually. Perennial streamflow occurs only in Little and Big Sandy Creek drainages which arise in the Wind River Mountain Range. Big Sandy Creek runoff is stored in the Big Sandy Reservoir and utilized for irrigation at Eden. Little Sandy runoff is also used for irrigation by direct diversion above the project. Other drainageways are either covered with brush or have a cobble pavement which indicates little runoff.

Vegetative Cover

Almost the entire subwatershed has a browse or shrub aspect. Vegetative density and vigor is generally high; however, in several small areas it is low. This is especially true of project lands because they have experienced severe drought for the past five to seven years. Associations of saltbush, black sage, yellowbrush, and other desert and semidesert shrubs make up the principal plant cover on the better drained intermediate terraces and gentle slopes adjacent to and intermingled with the project lands. Western wheatgrass and ricegrass are the dominant grass species. Saltsage and greasewood occur in characteristic association on the heavy alkaline-bottom soils.

Soils and Erosion

Most of the northwest portion of the subwatershed has alluvial soils on older terraces and terrace remnants. These terraces have a thin mantle of very sandy soils that are underlain by gravel and take water rapidly. These soils are resistant to water erosion but nonresistant to wind erosion.

The eastern portion of the subwatershed, including Little Sandy drainages, also have soils of alluvial material. These soils are medium to moderately-coarse textured and show less signs of wind erosion. Runoff is not apparent, except for a few small local drainageways.

Most of these alluvial soils are underlain by the Green River shales. There are some rough, steep, gravelly soils located on terrace margins and in ravines or drainageways. Some of the soils in the ravines are derived from Green River shales. These soils are fine textured and have developed a strongly saline-alkali condition.

Land Use and Land Ownership

This subwatershed is presently used almost exclusively for grazing of domestic livestock and big game. Estimated grazing capacity is about 100,000 animal unit months. About 80 percent of this grazing is on public domain administered by the Bureau of Land Management.

Some 65 ranch operators use the area for spring-summer-fall or spring-fall-winter sheep grazing. Use by cattle is very limited, with not over 350 head under grazing permit. Few ranch headquarters are located within the subwatershed with most headquarters being located on live streams surrounding the area.

Table 16. - Land ownership, drainage tributary to Seedskadee project lands

Class of ownership	Square miles
Private land:	
Railroad	74
Other	80
State land	69
Federal land:	
National Forest	18
Public domain - BLM	1,759
Bureau of Reclamation withdrawn lands	297
Total	2,297

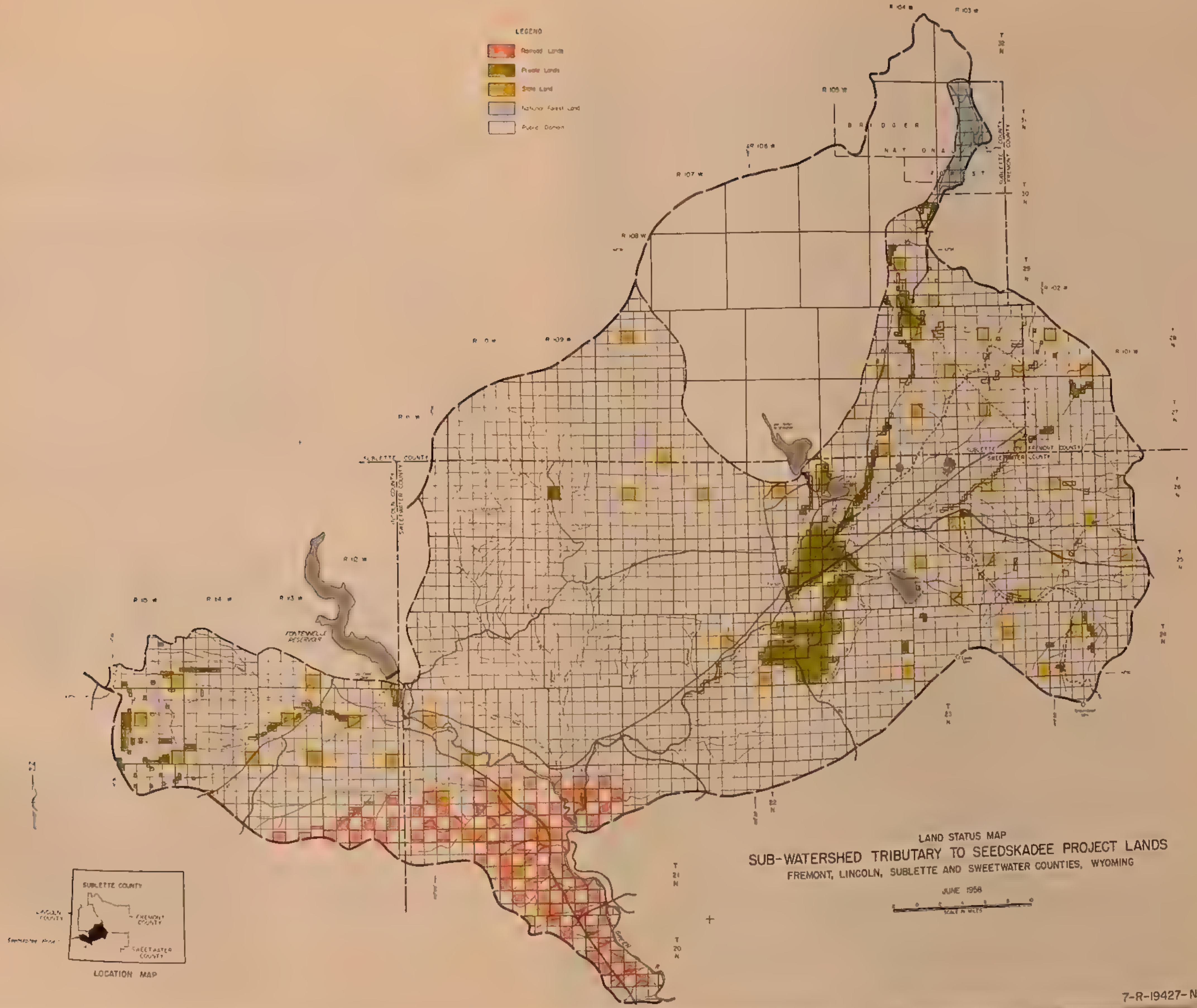
Subwatershed Problems

Most project lands are on terraces or mesas frequently dissected by drainageways. Local runoff from adjoining rangelands will be contained in these drainageways with little opportunity to damage cultivated land.

Drainageways through the project will be crossed by canals serving project lands. The Bureau of Reclamation will provide adequate floodwater protection facilities for the canals. Small local drainage areas will occasionally flood unprotected portions of canals. While canals may not be broken or service disrupted by these floods, sediment will be deposited in the system. Removal of sediment from the irrigation system may increase maintenance cost.

There is no evidence that drainageways through the project will encroach upon cultivated land with the increase of water for irrigation. Most of these drainageways develop an erosion pavement of cobble which give ample protection against erosion.

Wind erosion is active within the subwatershed. Blowing material from bare cultivated land and sparsely vegetated rangeland will accumulate in ditches. Cultivated land will be protected from wind erosion as soon as the development has been accomplished and crops are being grown. Rangeland can be protected by proper utilization of range forage. Until both of these areas are adequately protected, soil removed by wind will accumulate as sediment in the irrigation canals and system.



LAND STATUS MAP

SUB-WATERSHED TRIBUTARY TO SEEDSKADEE PROJECT LANDS

FREMONT, LINCOLN, SUBLETTE AND SWEETWATER COUNTIES, WYOMING

JUNE 1958

7-R-19427-N

U.S. DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE........M 2205

Land Treatment

Bureau of Land Management Lands

A need exists for additional range developments on Bureau of Land Management lands. The improvement plan of the Bureau of Land Management is shown in table 17.

Table 17. - Recommended land treatment, drainage tributary to Seedskadee project lands

Type	Unit	Amount
Grazing control & management	acres	1,123,760
Retention dams	number	75
Detention dams	number	5
Brush control	acres	1,000
Reseeding	acres	1,000
Water spreading	acres	40
Water wells	number	14
Spring developments	number	5

National Forest Lands

Little Sandy Creek is the only drainage without upstream storage which passes through project lands and has its origin on the Bridger National Forest. Its headwaters contain approximately 18 square miles of national forest lands. It is evident that watershed conditions on this small area will not directly affect the Seedskadee project. Examination of the stream at the height of its flood stage indicates that almost the entire flow is diverted for irrigation between the national forest boundary and the Seedskadee project lands.

Private and Other Lands

Private and other lands are located in small blocks and are interspersed and used with public domain lands. No special erosion problems exist on these lands and no land treatment measures, other than the proper use of rangelands, are required for improvement.

Flood Prevention Structural Measures

The character of the subwatershed lands adjacent to the project is such that flood prevention structures are not required to protect project lands.

Irrigation Aspects

The majority of the subwatershed lands adjacent to the project are rangelands. Irrigated farmlands of the Eden project, which are located above the confluence of the Big Sandy and Little Sandy Creeks, are so far distant from the project that return flow from irrigation water is not significant.

Drainageways are ample to contain anticipated flood flows through project lands. Structural measures and channelization have been planned as part of project development where major drainages intersect the canal system and cross project lands. Floodwater from small local drainage areas can be handled by regular ditch operation and maintenance.

B. Green River Drainage Above Proposed Fontenelle Dam

The Bureau of Reclamation's plans for the proposed Fontenelle Reservoir provide for a total capacity of 285,000 acre feet with an active capacity of 90,000 acre feet. The inactive capacity will provide sediment storage in excess of requirements. Watershed conditions above the reservoir vary widely. The rate of sedimentation and its ultimate effect on the project will depend upon the extent that vegetative conditions on the watershed lands are allowed to further deteriorate.

Subwatershed Characteristics

Topography

Elevation of the subwatershed varies from 6,500 to more than 13,000 feet above sea level. At elevations of 8,000 feet, and above, the topography is typically mountainous. From 6,500 to 8,000 feet the topography is generally rolling to flat. However, some steep foothill terrain is found near 8,000 feet.

Precipitation and Runoff

Precipitation varies from eight to thirteen inches on the flats and foothills and 30 to 35 inches in the high mountains. The mountainous area receives most of its precipitation in the form of snow and has practically no high intensity rains. The project water supply originates in this area and comes almost entirely from snow melt. The foothills and lower area are cool and dry with very little snow. Summer rains produce occasional flash floods on the foothills and below.

Vegetative Cover

Vegetative cover includes forests of conifer and aspen-type, brush, principally big sage, and grassland. High elevation lands are located in the Bridger National Forest and have vegetative types as shown in table 18.

Table 18. - Vegetative type, Bridger National Forest in Green River drainage above Fontenelle Dam, Seedskadee project

Vegetative type	Percent
Forest	
Conifer	24
Aspen	5
Brushland	19
Grassland	3
Subalpine	38
Weed	2
Naturally barren	9
Total	100

Other lands in the subwatershed are in public domain, state and private ownership. The majority of these lands have cover-types of irrigated hay meadows, big sage, grassland, weeds and some naturally barren areas. The major browse species are black sage, saltsage, greasewood and bitterbrush. Grass species are western wheat, Idaho fescue, needle grass, thickspike wheatgrass, and mountain brome.

Soils and Erosion

Erosion is slight on most of the national forest lands, however, there are scattered areas with severe erosion near the head of the Green River and east slope of the Wyoming Range. Erosion on the foothill and lower elevation lands is moderate to severe. Severely eroding areas are located along streams which are heavily used by sheep. Generally, the erosion over the entire foothill area can be considered moderate.

Land Use and Land Ownership

Lands within the subwatershed area are used principally for production of livestock feed. The majority of the irrigated land is used for production of hay or pasture, while the nonirrigated land is used for grazing. A large portion of the national forest land has multiple use, such as production of wood products, recreation and grazing.

Table 19. - Land ownership, Green River Drainage above Fontenelle Dam, Seedskadee project

Class of ownership	Square miles
Private and state land	1,123
Public domain - BLM	1,640
National forest land	1,572
Total	4,335

Subwatershed Problems

The water yield from the higher watershed lands, for irrigation and other downstream uses, is in excess of one acre-foot per-acre per year. Although downstream sediment damage is not serious, soil is eroding on critical areas within the subwatershed. This eroded soil is reaching streams and being carried as a sediment load. There is no evidence of destructive floods, however, problem areas do exist that could greatly increase the current sediment load if allowed to continue unchecked.

Land Treatment

The primary objective of a land treatment program is to stabilize soil and maintain a healthy plant cover for sustained production of useable water and forage for grazing animals. Treatment of sediment source areas in the subwatershed will reduce the production of sediment and lengthen the useful life of the reservoir. Problem areas recommended for land treatment are generally small in size and dispersed throughout the drainage area. Recommended land treatment is shown in table 20.

Table 20. - Recommended land treatment, Green River drainage above Fontenelle Dam, Seedskadee project

Treatment	Public domain BLM	Forest	State & private
Revegetation of rangelands	25,000 ac.	38,000 ac.	10,255 ac.
Gully stabilization	----------	100 mi.	----------
Fencing for grazing control	130 mi.	175 mi.	300 mi.
Roadside erosion control	----------	40 mi.	----------
Contour trenching	----------	5,000 ac.	----------
Streambank stabilization	----------	20 mi.	----------
Road building	50 mi.	45 mi.	----------
Detention dams	10 ea.	---------	----------
Diversion dams	15 ea.	---------	----------
Water developments	161 ea.	---------	275 ea.
Brush control	82,000 ac.	---------	48,000 ac.
Water spreading	500 ac.	---------	9,500 ac.
Deferred grazing	----------	---------	257,528 ac.
Proper range use	942,100 ac.	963,080 ac.	265,784 ac.
Irrigated hay or pasture seeding, improved water application and land leveling	----------	---------	110,577 ac.

<u>Findings</u> (Subwatersheds A and B)

Watershed conditions do not pose a flood hazard to the project. Most lands, to be cultivated on the project, are situated high above any area endangered by flooding from the Green River or other drainageways. Canals will be protected except from some small local areas and deposits of windblown sediment. Precipitation over most of the subwatershed tributary to the project lands is so low and the soils so permeable that little runoff is expected.

The subwatershed above the proposed Fontenelle Dam will contribute sediment to the reservoir. Reducing erosion on watershed lands will reduce sediment, improve watershed lands, reduce operation and maintenance costs, and lengthen the useful life of the project. Watershed treatment can be accomplished under regular programs of federal land administrating agencies and by private landowners with assistance such as would be furnished by federal and state agencies through Soil Conservation Districts and otherwise. Failure to promptly install needed remedial soil and water conservation measures will permit erosion to accelerate, add to the difficulty of their installation and result in loss of "on-site" production values. The users of watershed lands will receive sufficient benefits to justify their cooperation in this effort.

CHAPTER V

REGULAR ACTIVITIES OF THE U. S. DEPARTMENT OF AGRICULTURE PARTICULARLY AFFECTED BY THE SEEDSKADEE PROJECT

Introduction

The U. S. Department of Agriculture and the University of Wyoming are presently carrying out a number of agricultural activities in Sweetwater County, Wyoming. This is being done under regularly established programs. With the increased agricultural activity that would accompany the proposed development of the Seedskadee project, these programs would need to be accelerated.

Assistance furnished by these programs will materially aid and accelerate the settlement of project lands.

Agricultural Extension, Education and Information

Sweetwater County is the largest county, in area, in the State of Wyoming. It covers 10,495 square miles. At present there are approximately 21,000 acres of cropland in the county comprising 139 farms and ranch units.

Long distances between the various farming areas make this a hard county to work as considerable time is involved in travel. Due to distance and diverse interests, it is hard to bring people together for educational activities.

There is a rather heavy urban demand for assistance from the Agricultural Extension Service in both Rock Springs and Green River, with a combined population of about 20,000 people. This, along with the servicing of the rural families in widely scattered areas, provides a heavy workload for the County Extension staff. The present staff in Sweetwater County includes one county agricultural agent, one home demonstration agent, and one secretary.

With the proposed development of 59,620 acres of new land, approximately 300 new farm and ranch units will be developed. This, in addition to the 139 present operators, will make a large group of farm and ranch families to be served by the Extension Service, along with meeting the demands by the urban people in Rock Springs and Green River.

New farmers and ranchers, or those transplanted from one area to another, usually need more assistance than those having been in an area for a number of years. The demand for assistance in farm and home development will be greater than the present staff can supply. It is also expected that the present units will continue to require increased assistance. In a new area, such as this, it will be well to launch a farm and home development program as soon as settlement begins.

In view of these circumstances, at least one assistant county agent, one assistant home demonstration agent and one additional secretary will be needed to work in Sweetwater County. The added burden on the state staff will also make it necessary to add a combination agronomist and plant pathologist to assist with specific problems on the project.

Based on present salary rates and travel costs, the added annual costs would exceed $26,000. 1/

Technical Assistance

No Soil Conservation District exists in the area at the present time, however, past experience indicates that once the area is developed the organization of a district can be anticipated. Because of the geographical location of the project such a district will undoubtedly maintain headquarters at Green River, Wyoming. In order to provide technical assistance to the district it would be necessary for the Soil Conservation Service to establish a new work unit office at that location.

The demand for technical assistance from the settlers of a new irrigation project is expected to be heavy. Irrigation will be new to many of the settlers of the area and technical assistance will be required in connection with the layout of farm distribution systems, field layout for land leveling, irrigation structures and on-the-farm assistance in irrigation water management.

Considerable agronomic and soils assistance will also be required in assisting new settlers in planning and applying conservation practices, selecting proper crop rotations, establishing improved irrigated pastures, and the management of such pastures.

Establishing, staffing and maintaining a suitable work unit to service the proposed Seedskadee project area would cost over $30,000 the first year and over $26,000 annually thereafter, based on present salary rates. 1/

Snow Survey and Water Supply Forecasts

Accurate snow survey and water supply forecast information can be of considerable value to the water users in planning their farming programs and to the irrigation district itself in operating the irrigation works. Water supply forecasts are currently being made by the Soil Conservation Service for the Green River near Fontenelle, Wyoming. The forecasts of tributaries above Fontenelle are based on very meager information.

1/ Agency estimate.

In order to establish an adequate snow course network on the Green River above the Fontenelle Reservoir, two additional snow courses are needed. One would be a high elevation snow course within the New Fork River Basin, and the other located somewhere in the neighborhood of Indian Mountain on the Fontenelle and LaBarge Creek drainages.

Farm Financing

The Farmers Home Administration has had considerable experience with the newly developed reclamation projects in the vicinity of Riverton and Powell, Wyoming. Through the years they have made a loan of some type to almost every project settler. With the development of the Seedskadee project it will be necessary to increase personnel in the Rock Springs office from two to four people, making it a two supervisor office or greater, and open an office at Evanston after settlers have been selected for the project. At present one supervisor services Sublette, Sweetwater, and Uinta Counties.

The development of this project is expected to result in a substantially increased need for all types of loan funds, as well as an increase in personnel.

The great majority of settlers probably will need Operating Loans for at least ten years. An estimated one-half of them will need Soil and Water Conservation Loans to develop domestic and farmstead water supplies and one-quarter will need Farm Ownership Loans for dwellings, farm buildings, fencing, land development, and water development. Some will need only Farm Housing Loans to construct dwellings and farm buildings.

Cost-Sharing for Conservation Measures

The major portion of the project will be served by the Sweetwater County Agricultural Stabilization Conservation office, with headquarters in Rock Springs. A small area will be developed in Lincoln County, where the Agricultural Stabilization Conservation office is headquartered in Afton.

Assuming that Congressional authorizations permit continuation of present conservation practices, rates of cost-sharing, and program policies, it is anticipated that an additional allocation of $35,000 annually will be needed to provide cost-sharing in the project area for permanent vegetative establishment, irrigation system reorganizations, land leveling, drainage, shelterbelts, and other miscellaneous practices for which cost-sharing is provided under the Agricultural Conservation Program. Without an increase in funds to meet these increased conservation needs, the Sweetwater County Committee would be almost completely ineffective in using the Agricultural Conservation Program to facilitate settlement of the project.

It would also be necessary for the Sweetwater County Committee to employ a full-time field employee for necessary field work in the project area. In addition, the county committee would likely establish a "Seedskadee" community to provide the new area with appropriate community committee representation in matters pertaining to program administration in the area.

The Wyoming State Agricultural Stabilization Conservation Committee feels confident that the additional conservation needs incident to the project development can be effectively met by implementing the above changes.

National Forest Land

Inasmuch as the proposed project features and project lands are all outside of the exterior boundary of the Bridger National Forest, the project will have relatively little effect upon the regular program of the Forest Service. The going program on national forest land includes measures for the restoration and proper management of plant cover and the maintenance of soil stability. These activities will aid the general watershed protection objective of red reducing floodwater and sediment hazards to project installations and their maintenance. The going program also will take care of increased demands for national forest resources that the project may create.

Research Needs

A comprehensive report covering general research needs for the area of the Colorado River Storage Project will be developed by representatives of the U. S. Department of Agriculture research agencies, state agricultural colleges, and experiment stations. As far as the Seedskadee project is concerned, there appear to be no research needs peculiar to this project that would not be covered in the above-mentioned report.